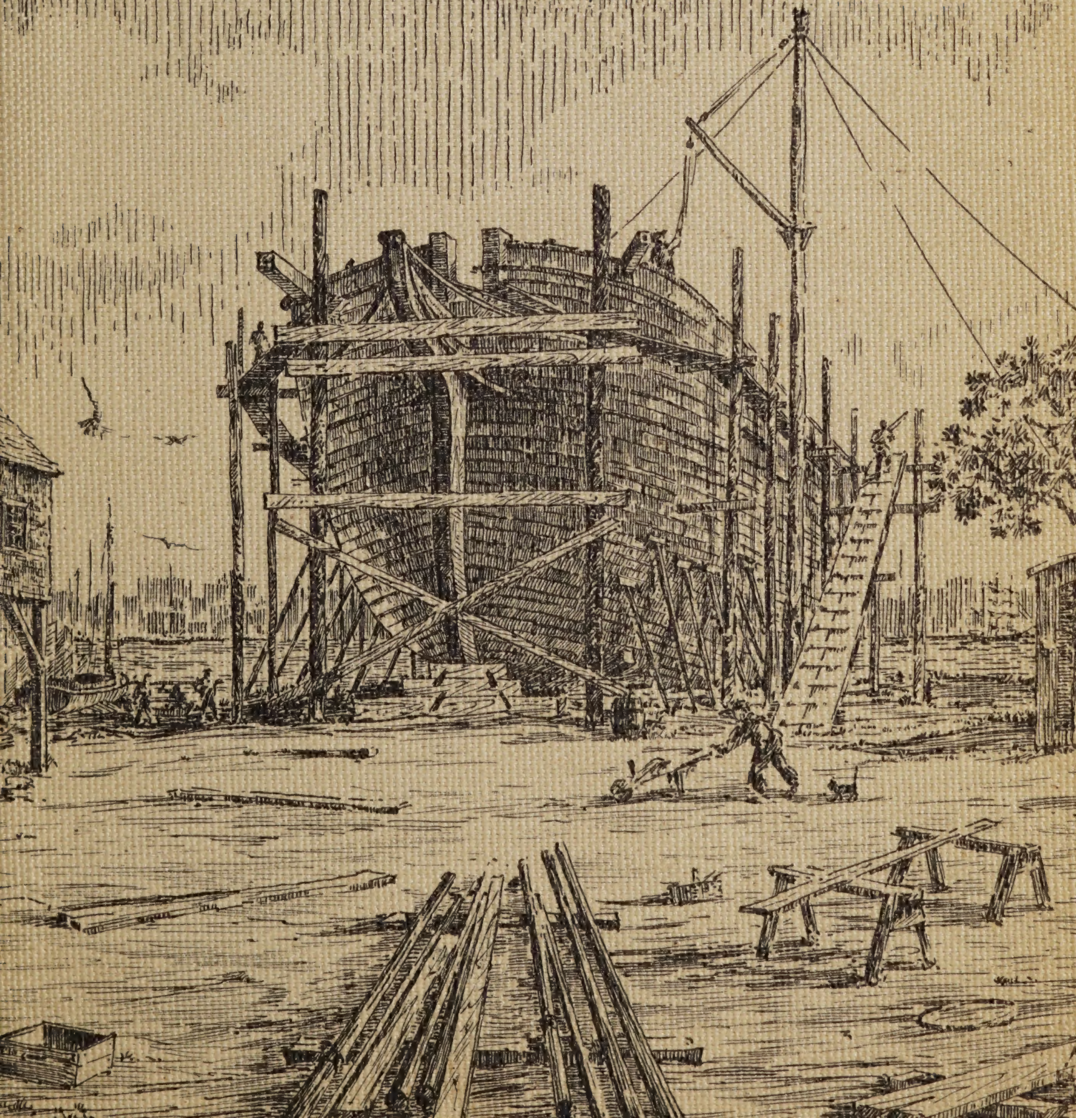
BIRTH OF A WHALESHIP



BIRTH
OF
A WHALESHIP

Published by
New Bedford Free Public Library

Reynolds Printing, Inc.

IT is with a great deal of appreciation that the Board of Trustees of the New Bedford Free Public Library offers its thanks to the HENRY P. KENDALL FOUNDATION whose generous assistance has made the publishing of this volume possible.

Dedication

to

WILLIAM H. TRIPP

for his encouragement and willingness
to share his great knowledge of whaling.

R. B. H.

Bark CANTON Homeward Bound – 1906

The Canton was built in Baltimore in 1835. Her dimensions were – Net tonnage 226.88 tons, Length 103.1 ft., Breadth 24.8 ft., Depth 15.4 ft. She was wrecked on Maio, Cape Verde Islands, in 1909.

"There's nothing like a ship at sea
With all her sails full-spread,
And the ocean thundering backward
'Neath her mounting figurehead —
And the bowsprit plunging starward
And then nosing deep again,
There's nothing like a ship at sea,
Sing Ho! ye sailormen."

—KEMP

ACKNOWLEDGMENTS

THREE men were as necessary to this work as was the harpoon to the whaleman. Without their knowledge, and, more importantly, their willingness to impart this knowledge, this volume could never have been written.

WALTER E. CHANNING – an architect who in his spare hours took the lines directly from the whaler hulls that remained in the early part of the twentieth century. His plans of the "Beetle" whaleboat, made from the lines and dimensions of the builder Charles D. Beetle, are most authentic. But for Channing's interest, no plans would be available since blueprints of the whaleships were never drawn.

JOHN W. DURANT – a sailmaker whose skilled hands now produce swift running yacht sails, outfitted more than one of the last of the whaleships. The sailmaker's job was a difficult one – for who knew how hard the winds would blow and what pressures the sails must meet. The whaleships are gone, but one last piece of his work remains – the sails aboard the ship "Charles W. Morgan," now at Mystic Seaaport, Mystic, Connecticut.

MILTON K. DELANO – an architect whose talents are further expressed in brush and pen. His illustrations of this volume are proof of that fact. Yet, he is best known for his role as this nation's greatest living artist in the field of scrimshaw, and he follows a long tradition that reached its zenith in the work of the whalemen.

PHOTOGRAPHS – New Bedford Free Public Library.

COVER DESIGN – Milton K. Delano.

TABLE OF CONTENTS

PART I

THE BIRTH OF A WHALESHIP

PART II

WHALEBOATS

FOREWORD

IT has been aptly said, "A sailing ship is the most beautiful work of man." To this might be added, "It is also the most wonderful structure built by man." Of course, with this latter, some will differ and make note of the many beautiful bridges and towering skyscrapers, all wonderful examples of man's ability to construct. But, before deciding as to structural perfection, imagine what would happen if their foundations were suddenly tilted up and down forty feet, with the tops of the building gyrating through an arc of 90°. Their very existence depends on a stable foundation: literally, it might be said, they float upon the earth — move that earth to any great degree and they collapse.

On the other hand, ships sailing the ocean are very often subjected to those very same conditions and most generally survive. Ships, even though tossed about and buffeted by seas that can and do strike with a force of more than a ton to a square foot, sailed and returned with surprisingly few losses, when we consider the great number that sailed the turbulent ocean.

Although lacking such world famous names, in ship construction, as Hall, Webb, Griffiths, and McKay among their number, the old time whaleship builders never the less made a valuable contribution to the long, long, evolution of sailing ships. The sturdy craft they so painstakingly designed and built, truly did their part and honestly deserve undying recognition.

It is to describe the construction of the typical whaleship of a by-gone era, known as "The Golden Age of Whaling," that this book has been written.

PART I

THE BIRTH OF A WHALESHIP

THE WHALESHIP

CHAPTER I

DURING that by-gone era, known as the "Golden Age of Whaling," a forest of masts was as commonplace to the inhabitants of south-eastern Massachusetts, Rhode Island, and Connecticut as were the clusters of houses that bordered "Main Street." Today, with the exception of the CHARLES W. MORGAN, now berthed at Mystic Seaport, the old New England Whaleship is but a memory to an ever lessening number.

Although the foundation of the prosperity of such cities as New Bedford, New London and towns like Mattapoisett, Marion, Dartmouth, and Nantucket was based on whaling almost exclusively, the passing years have almost obliterated authentic knowledge of the details of those grand old craft, their dimensions, shape and rig; also, it is all too true, strange as it may seem, with that dying knowledge there is a fast waning interest in the old home ports. Incredible as it may seem, any revival of interest in those grand and glorious days of whaling is by those far removed from the once great whaling centers.

The master builders, ship carpenters, joiners, caulkers, spar-makers, pump and block makers, riggers, sailmakers, and all those who bore a hand in the fabrication of the sturdy old whaleships have passed on to a greater reward. Of the multitude who manned those ships only a few are now living — the inexorable march of time will soon leave no one who can give first hand information of whaling and whaleships.

Many volumes have been written with whaling as a basic theme — from the polished literary fiction of MOBY DICK, through the narrative of Captain George Fred Tilton and the story of "Captain Joe," the general subject of

the pursuit, capture, and killing of whales, the removal of the blubber and boiling out of the oil has been clearly described. But, in all of these almost nothing of definite nature has been written about the most important factor in the whole business, the whaleship itself.

Lacking the glamor of the racing clipper, those old ships have been considered commonplace — as being cast all from the same mould. While many accounts of clipper ships have been published, giving their records, their lines, spar and sail plans, nothing of this sort has ever been done for the whaleship despite the fact she had to possess certain qualities as necessary to her success as was speed to the clipper.

This account, which is based on notes made by old-time shipwrights and ship carpenters, will attempt to give as accurate a picture as possible of the construction of the hull, the general details, and the building of the various accessories, such as spars, rigging, sails, and boats, that go into the fabrication of the completed ship. These notes were made over a period of more than seventy years, during the time when the old whaleships were a common sight at the wharves and in the harbor of New Bedford, some being "laid up," some being made ready for sea and, in the 70's, some being demolished for their copper fastenings. It was from the latter that a definite knowledge as to how those long lived old craft were constructed, was gained. These and dimensions taken from the CHARLES W. MORGAN make it possible to give an accurate description of the construction of a typical whaleship of the 1850's the peak years of American Whaling.

During the very early days of whaling most of the vessels were either ship rigged (square sails on all three masts) or bark rigged (square sails on two of three masts), it is to describe the construction of these "square riggers" that this is written.

THE MODEL

CHAPTER II

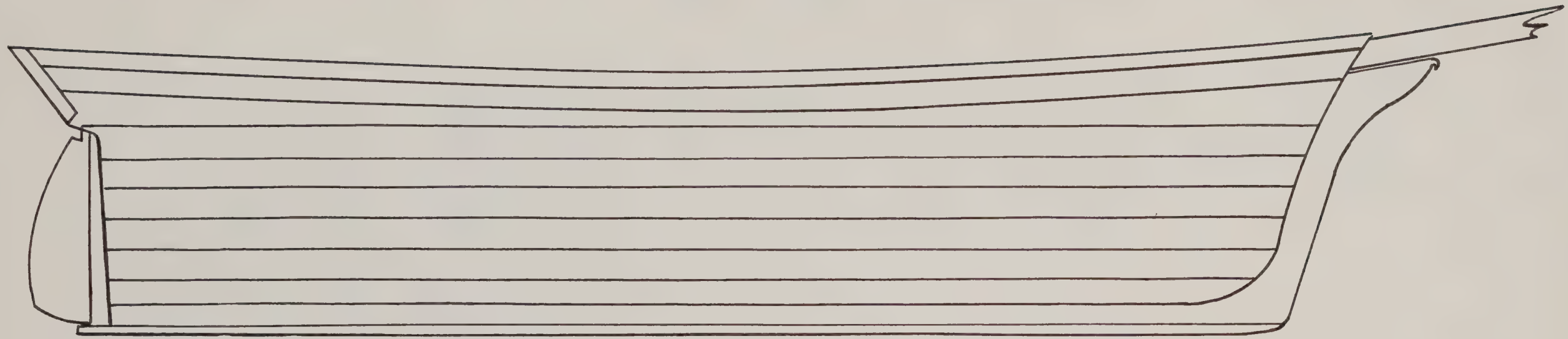
IN most of the literature dealing with whaling, the ship is described as a clumsy old hulk, "built by the mile" and nearly square at both ends. That, no doubt, was how they appeared to most authors who saw only what was above the water-line. Strange as it may seem to the inexperienced eye, no two were exactly alike in size, shape, or sailing qualities. Each vessel had different characteristics that were easily recognizable at great distances by those familiar with the various whalers.

Through the years experience clearly indicated that a certain type vessel was generally more successful than others, hence this shape became predominant in the design of whaleships. The greatest departure from this basic design was in the construction of the later whalers, these were intended mostly for work in the Arctic.

Most, if not all, whaleships built during the last 100 years of the industry were shaped from block half-models, usually scaled at ¼, ½, or ¾ of an inch to a foot. Any plans that might have been made were very simple and seldom saved. Some of these half-models are still in existence and it is from these that we are able to obtain a better idea as to the shape of those old time ships.

In these modern days, ships, like buildings, are built entirely from plans – plans that depict every part down to the smallest bolt and screw. In the days of whalers, models, so shaped as to please the eye, were the beginning of every ship. Often a ship would be modeled after another, with a few slight changes being made to suit the ideas of the owners. Close examinations of those old models of whaleships reveal those general characteristics so common to all.

HALF MODELS



"Bread and Butter" Type

By outlining the horizontal layers a series of waterlines may be made from which a cross section view can be obtained.

"SOLID" TYPE

From thin wooden templates, carefully fitted to predetermined points, called "stations," a cross section view may be obtained.

From the sectional "Solid" type a cross section may be obtained directly.

In general, the average length at the water-line was between 100 and 108 feet with an over all length, from the after end of the taffrail to the outside of the knightheads, of from 108 to 116 feet. The greatest beam was 25 to 28 feet and the draft, depending on the cargo, was about 14 feet forward and 15 feet aft; some of the extra deep ships drew as much as 18 feet. Because the old ships varied in size, arrangement and other minor details, no single vessel can be chosen as being fully typical. Over all the CHARLES W. MORGAN is as near to being an example of the typical whaler of the 1850's as ever was built, even in regards to the MORGAN there is a very radical departure from the generally accepted construction. The MORGAN'S forecastle companionway is abaft the foremast, a position peculiar to that ship and that ship alone. It is because of the many possible variances from a so called "standard" that these facts and figures are based on averages.

The average whaleship measured about 300 tons, with a moderate beam and quite deep, with two decks, she was very full, in fact almost square at the bow on deck, to accommodate the long and bulky windlass. The lines of the bow were eased below the deck — below the waterline some were almost sharp.

They were straight sided with the greatest beam about two fifths of their over-all length aft of the bow. They were not, as generally believed, "barrel" bottomed — the main floor timbers had a moderate dead rise of 12 to 18° and were straight for eight or more feet from the keel. The turn of the bilge was quick, resulting in a very long floor carried well forward and turned into a very fine "run," aft.

The curve of the lower part of the stem and forefoot varied according to the shape of the trees available. Usually the curve of the rabbet at the forefoot was short, a radius of two feet or less being quite common, in some cases the curve might be somewhat longer. The sterns were wide and square with low quarters that were about three-fourths the width of the vessel's beam. The tumble home was moderate, being but six to eight inches amidships.

In the construction of a whaleship certain basic qualities must be incorporated. The ship must have room to carry a large, rather than heavy cargo, accommodations for officers and crew on long voyages, where every man would have a berth rather than a hammock, arrangements to safely carry a large number of boats, usually seven, seaworthiness to the nth degree, ability to lay quietly when "hove to" in a heavy sea especially with a whale alongside, be stiff enough to carry sail and hoist heavy weights and still be limber enough to avoid excessive strains when "cutting in" whales. These were just some of the requirements that must be met and, since many of these ships sailed in uncharted waters or in the ice choked Arctic they must, of necessity, "handle" surely and quickly to avoid a suddenly sighted danger.

Whether it be from unusual intelligence, experience, or both, the old time ship builders certainly built ships that were truly designed and fitted for their peculiar service. Time has proven that no safer or longer lived ships have ever been built than those locally built New England Whalers.

FRAMING THE SHIP

CHAPTER III

HAVING reached a decision as to size and model, the next step is to "loft" the shapes to full size. Each shipyard had what was known as a mould loft, this could be any fairly large unbroken area of smooth floor.

The majority of the half models were made up "bread and butter" style i.e., a series of ¼, ½ or ¾ inch thick boards fastened one on top of the other and held together by dowels. The preferred thickness of these boards would be the same as the scale used in the yard or a multiple of the lesser scales. The "lines" of the model would be laid out on paper by taking the model apart and marking around each layer, thus making a series of water-lines from which a cross section could easily be obtained. Some half models were solid in which case thin wooden templates would be carefully fitted at pre-determined intervals, called "stations," and the cross sections obtained. Some "solid" half-models had perpendicular cuts at the "stations," thus separating the model into sections. Plans similar to those obtained by the template method could be drawn by tracing the outline of the sections. In this latter type the sections were either "pinned" to a board or were mortised on the back so as slide along a narrow board.

Whichever method was used, the "lines" of the model were laid out full size on the mould loft floor. Usually each shipyard used the same scale in all of its construction thus permitting the "measuring stick" or ruler to be marked to show the full size dimension directly; e.g., one foot instead of ¼ inch, four feet rather than one inch, etc. From these enlarged drawings thin wooden patterns would be made of the principal shapes, the patterns were placed on suitable logs and the shape of the desired timber marked out.

THE SHIPYARD – Showing hull partly framed.
Courtesy Peabody Museum.

It might be well to note at this point that in ship construction the so-called "ribs" of a ship are known as TIMBERS.

Considerable adjusting was required when taking off the lines from a model to make certain the curves were "fair" when being laid out on the floor, this necessitated a true eye and excellent judgment. Those entrusted with this task were men whose knowledge and ability was far above that of the average run of ship carpenters. Even during the "heyday" of whaleship construction there were comparatively few of these so-called "boss liners" and, those few were looked upon with a kind of awe by the average workman.

Naturally the master ship builders were well acquainted with the capabilities of the various men, who were grouped loosely into gangs; the axemen being called "hewers," the adzemen "dubbers," and the auger men "borers." Many of these could do a creditable job at other than their specialty though not all good hewers were handy with the adze, most dubbers could hew and nearly all could bore. Naturally, as in every line of endeavor, the real experts possessed the ability to far excel their fellow workers. Some of the hewers and dubbers could do work with the broad axe and adze that very nearly equalled that of a jack-plane. As for expert borers, it was often said they could make a chalk dot on the outside of a ship, another somewhere opposite on the inside, then start from either, and, after penetrating a foot or more of wood, bore out the other dot when the auger came through.

It must have been an inspiring experience to watch the construction of a whaleship – to see the manner in which shapeless pieces of wood were fashioned into a living ship, seemingly as by magic. At first, great logs, some straight, others curved, and huge knees for the quick curves, were scattered over an acre or so of ground so as to be readily accessible. Then the liners with their thin patterns would be selecting and marking crooks, sweeps, and bends. These would be followed by the hewers, perhaps fifty in number, who would make the air vibrate with the ring of their axes. Those were the days long before the band-saw and

other power tools; planks and straight timbers would be sawed in the country saw-mills, and the knees, if they were not too large, would be sawed to thickness, but the greater mass of shaping was done by the axe and the adze.

The local woods most used were; white and yellow bark oak, white and pitch pine, yellow pine from Georgia and live oak from Florida were also used. Of all the woods that were available for a ship's frames, live oak was the strongest and most lasting. Very often it was said, "A ship with live oak frames and copper fastenings would last forever," the truth of which the CHARLES W. MORGAN, now in her one hundred and twenty-fourth year, seems to substantiate.

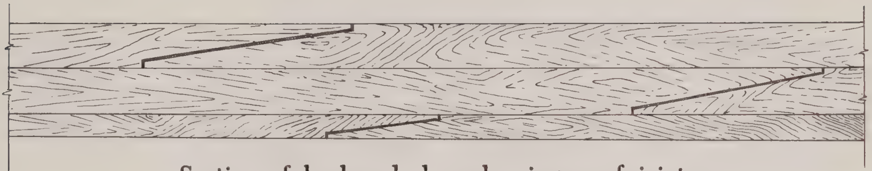
Next to live oak in strength and general resistance was our native white oak, which grew best in open spaces where they were not crowded by other trees, it was often called pasture oak. It was not so large as live oak but white oak trees two and a half feet in diameter, with a trunk thirty or more feet long were quite common. These were large enough for any timber used in a whaleship and, like live oak, white oak had very large limbs that made excellent crooks and knees.

Yellow bark oak, usually as large as white oak, has a longer trunk free from limbs, it is a very durable wood and was much used for planks where long, clear lumber was required. But of all our local trees, for strength and durability, white oak was without question the best.

Chestnut, when available, was often used for the upper ribs (timbers) and deck frames, as it was light in weight and durable. Native pitch pine was also sometimes used for upper ribs and deck beams though seldom in whaleships, since it lacked the strength of oak. Its use in this connection was quite common in coasting schooners and small vessels.

Locust was the best of local woods for tree-nails (called trunnels) and for small parts requiring great strength and durability — since this wood was comparatively scarce, white oak was generally used for this purpose instead.

The keel, which is the foundation of the ship, was built up of two lines of hewn oak logs 14 to 16 inches square,



Section of keel and shoe showing scarf joints.

placed one upon the other and securely bolted together. Where the logs met end to end, they were scarf spliced with the splices being four to six feet long and placed as far apart as possible. This resulted in a built up keel about a hundred feet long and about three feet deep. Since the bottom of the keel was liable to damage from grounding and might require replacement, there was a thinner layer, called the shoe, below the other two; this layer was usually but six to eight inches thick and was fastened with treenails or spikes. When we say the upper layers were bolted together it must be understood that many of the so-called "bolts," used in old time ship construction, were simply iron rods with each end "headed over forelock, i.e. the ends peened over washers. The diameter of the holes into which these bolts were to go were usually 1/32 to 1/16 less than the diameter of the bolt. A considerable amount of force was required to drive these bolts "home" but, they seldom loosened. The keel extended about two and a half feet below the bottom of the ship.

The stem was usually about twelve inches thick and eighteen to twenty-four inches deep. The preference was for white oak with a large root to lap upon the keel as a foot knee. This would put the toughest and hardest part of the tree where it was most needed, at the foot of the stem. If a tree with a suitable root was not available, one with the right kind of a limb sometimes would be used. If neither was available a heavy knee might be bolted to the foot of the log. This latter was not considered good construction since the heel of the stem, with little or no bracing from the planking, would have a tendency to split where the bolts passed through.

Inside the stem and extending nearly its whole length was the "apron," which strengthened the stem and made a

much larger bearing and fastening area for the forward ends of the planking.

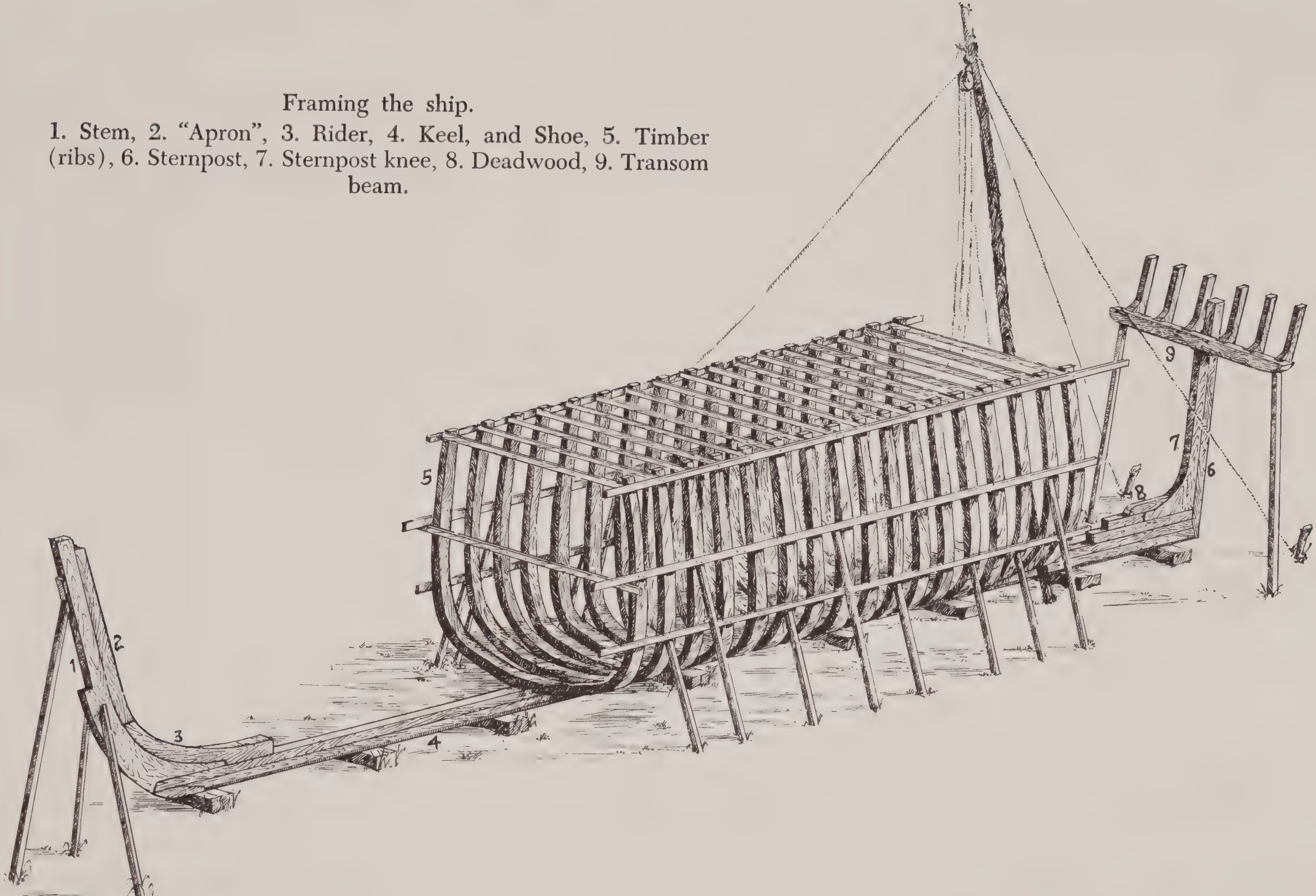
Extending back on the keel and lapping over the stem knee up to the apron was the "rider" or forward deadwood to which the lower ends of the bow timbers were fastened.

The sternpost, also twelve or more inches thick and eighteen to twenty-four inches deep, extended down past the end of the keel to the shoe where it was often cross-tenoned. "Anchor" plates of bronze about ¾ thick, 3½ wide at the ends, 2½ wide in the center and 18 inches long, were sunk flush on opposite sides of the keel and sternpost and through-bolted. This prevented the sternpost from dragging away from the end of the keel.

Since the lower stern waterlines of the old whaleships were "thin" (sharp), the after end of the keel had to be built up with deadwood, sometimes extending along the top of the keel for as much as twelve feet and two or more feet high at the sternpost. The sternpost knee, which was as thick as the sternpost, usually was directly on the keel though sometimes it was on the first log of the deadwood; the rest of the deadwood was fitted to the curve of the knee.

Where the planking joined the stem, keel, and sternpost it was fitted into a groove called a rabbet, this was cut so the ends and edges of the planks resting in it would have the ends and edges cut square. The inside of the rabbet was bevelled back so the planks would bear the full width of the rabbet. Laying out and cutting the rabbet required great skill and was usually cut before the stem, keel, and sternpost were raised. Any slight amount of trimming needed was done as the planks were put on. The outer or face edge of the rabbet was generally six inches below the top of the keel and about a foot inside the outer edge of the stem and sternpost.

With these parts ready, the keel is placed on blocks and the stem and sternposts hoisted into position where they are held with iron "dogs" and screw clamps; they are plumbed and shored with large pieces of timber then, after the riders and deadwoods are fitted and clamped, the fast-



Framing the ship.
1. Stem, 2. "Apron", 3. Rider, 4. Keel, and Shoe, 5. Timber (ribs), 6. Sternpost, 7. Sternpost knee, 8. Deadwood, 9. Transom beam.

ening holes are bored and all is secured with driven "bolts" an inch or more in diameter and three to four feet in length.

While the building and setting up of the keel, stem, and sternpost was progressing, the different gangs would be hewing to shape and setting up the "timbers" (ribs). These timbers, because of their "U" shape, were made up of two thicknesses of stock, placed side by side and tree-nailed together. The pieces on one side would be of such a length as to permit their centers to be placed opposite the joints of the other half. The extreme curves, such as those at the turn of the bilge, and some of the floor timbers, were made from logs with branching limbs. It required extreme care in the selection of logs so that the grain of the wood would follow closely the shape of the finished timber.

The bottom section of each pair of timbers (ribs) was called the "floor" and were cut out of curved, crooked or knee logs as needed. They extended clear across the keel and out on each side as far as the legs would reach, because the legs of each floor were often of unequal length they were placed so the long legs alternated on opposite sides of the keel. The floors, extending across the keel, tied the sides of the ship together at the keel and secured the feet of the timbers (ribs). Usually the floors were about half the thickness of the timber at the keel, the other half of the timber extending beyond the legs of the floors. Both the floors and timbers were notched out about two inches where bearing on the keel, this provided two inches of solid keel about the rabbet, thus the caulking could not work or be driven through. Either over the center of the keel or sometimes at its sides, the timbers were cross notched about two inches so the water in the bottom of the ship could run fore and aft to the pumps, these notches were called "limbers."

The timbers (ribs) with their floors were shaped and built up on the ground in pairs, each pair extending clear across the ship and looked like huge wishbones or broad letter "U"'s, depending on where they were supposed to be placed. After being secured against change of shape by temporary cross bands and braces and carefully centered for

plumbing, they were hoisted onto the keel and shored up in the exact position desired. When several sets of timbers were set, strips of joists, running fore and aft, nearly level, were spiked on the outside about a yard apart. As more and more timbers were added these joists or "battens" would outline the entire shape of the hull. In general the main timbers were finished twelve by twelve at the keel, six by twelve at the upper ends or heads and spaced about a foot apart.

Because of the straight sides and quick turn near the stem, which was called the "bluff of the bow," the most forward or first pair of timbers (ribs) were just aft of this "bluff." The timbers from there to the stem were single rather than being joined in pairs, they were slanted forward and called "cants." They were placed side by side at the feet, higher up as they spread, shorter timbers were placed between them which made the bow almost solid timber. While the regular timbers (ribs) were sawed off at the underside of the planksheer or about eight inches above the deck beams, the bow cants extended up the full height of the bulwarks.

On each side of the stem, about two feet apart, were the "knightheads," timbers about a foot square and extending about two feet above the main rail.

On top of the floors and timber feet, with bolts down through the floors into the keel, was the keelson which was usually made up of two logs sixteen inches square. These ran the length of the ship, lapping the rider forward and the sternpost knee aft. The long scarfed splices were so placed that no two were in line in the keelson or with those in the keel below. Thus the keel on the outside and the keelson inside made the backbone of the ship — a backbone of nearly six feet of solid oak.

On each side of the keelson were the sister keelsons, each made up of oak planks six inches thick and 14 to 16 inches wide. Some ships had a single line of these planks but the better construction had two lines placed edge to edge.

In the center of the curve of the bilge and extending the length of the ship were the bilge clamps made up of oak planks four to six inches thick and a foot wide, usually there would be two or three widths of these planks.

Since the timbers (ribs) were mostly built up of two parts in thickness the fastenings of whatever crossed them, such as clamps, sister keelsons, ceiling and planking, were staggered, the bolts, spikes and treenails being driven into each part alternately.

The most difficult part of the ship to lay out was the framing of the stern. A little above the waterline, on the forward face of the sternpost, was bolted the transom beam, a piece of timber 12 to 16 inches square at the center, the top being level and the bottom trimmed to fit the inside of the planking. Into the after edge were tenoned, side kneed, and bolted the stern timbers about two feet apart. These were made of knees about six to eight inches thick with their bottom edges cut to the angle at which the side planking met the underside of the transom. The stern is rounded out crossways, about one foot in twenty and the arch of the stern about the same as that of the deck.

The two center stern timbers were nearly three feet apart to take the boxing of the rudder post. During the early days the rudder stocks were square with the forward sides beveled each way from the center to allow it to turn, the two after corners were slightly rounded, because the rudder was "hung" by bronze pintles, centered under its forward edge, it required a large port to swing in. A plank or "furring piece" was spiked to each side of the sternpost and a box made of three or four inch thick planks, reaching from the transom to the deck, was built in. Those ports were so large that, with the rudder out, a man could easily get inside to make repairs. The so-called "patent" rudder, with its overhung round stock that fitted closely in a circular port, did not come into general use until quite late.

The main beams were usually of oak, chestnut or yellow pine, cut to crown about six inches in the width of the

vessel. The ends of these beams rested on the deck clamps, long oak planks, four inches thick by ten wide, extending in a double line (two planks deep) the whole length of the vessel under each deck. The clamp planks had long scarf splices where the ends of the planks met, these deck clamps were heavily bolted to the timbers (ribs).

At the bow, resting on the clamps and extending back from the stem on each side about six or more feet, were the "breast-hooks" made of heavy curved pieces. The breasthooks were fitted against the stem forward and the "cants" and timbers (ribs) on the sides. At the stern were similar knees called quarter knees.

The deck beams at each end of the hatchways, mast holes, and other openings in the deck were extra heavy, these beams as well as all others were fastened at the ends with side knees, usually of hakamatack and, in those places of extra strain there were hang-knees fitted out under the ends of the beams and down over the clamps and ceiling. Generally the main beams were ten or twelve inches wide and eight inches thick, spaced about six feet apart; centered between these were smaller beams about eight inches square, called "carlins," the ends of these were notched onto the side knees of the main beams. The deck beams were set so the fore and aft sweep of the deck would be the same as the sheer of the hull, except for a dozen or more feet near the bow. This gradual leveling of the deck forward was such as to put the fore part of the deck about eight inches below the true sweep had it been carried clear forward. This arrangement, peculiar to whaleships, made it possible to put the chain pipes above the deck.

The multitude of strains to which those ships were subjected had a tendency to not only wrack them out of shape but also to cause them to spread; since the only cross ties above the floor timbers were the deck beams it was imperative that the ends of those beams be fixed to the sides of the vessel in the strongest possible manner, hence so many knees.

The frame of a whaleship was an incredibly strong structure — the keel outside and the keelson inside formed

the backbone of the ship, a backbone of solid oak six feet thick reinforced by sister keelsons of oak along each side. The ribs were tied and braced by the floor timbers and deck beams; the whole was tied together by the bilge and deck clamps to form a structure that would spread the stresses and strains so they would be borne over a very large area. The fact that so many of those old ships plied their trade successfully for well over fifty years is eloquent proof as to the mechanical skill and judgment of the old-time New England Ship Builders.

PLANKING THE SHIP

CHAPTER IV

THE bottom planks on each side (those nearest the keel) are called "garboards" and the top line of planks (at about the deck level) was called the sheer strake. From just below the waterline to the sheer strake the planks were nearly all the same width with almost parallel edges and were called wales. Any one line of planks that extended the whole length of the hull was called a strake, those planks forward that had to bend around the bow were called the "bends."

The garboards were usually white oak about four inches thick with the rest of the planking sometimes only three inches thick. Forward and below the waterline the planking would be oak with the wales often being of white pine.

All the bends as well as many of the after planks had to be softened by steaming and were bent to shape by being clamped in place while still hot. All the old-time shipyards had large steam boxes for steaming these planks. These "boxes" usually consisted of large kettles set in a brick oven-like structure with the kettles connected to long plank boxes that were used in the steaming process. As the various planks were wedged and clamped into place they were only partly fastened, the permanent fastening being done by a "follow-up gang of borers and fasteners", who bored holes and drove the spikes, bolts, or treenails, which were to hold the planking in place.

Where the ends of the planks met they were square butted a half inch to one side of the center seam of the timbers (ribs). The butts and wood ends (where the planks met the stem and sternpost) were sometimes fastened with spikes but in general the fastenings were treenails.

Laying out the planking required a knowledge and judgment only acquired through years of practice. Each strake had to be run in such a way as to cause the least possible strain on the plank where it had to be bent or twisted, always keeping the lines smooth, without short crooks. On those "wall-sided" ships laying out the wales (water line to sheer strake) was easy once their width was decided on, usually six, seven, or eight inches. The number required could be determined by the spacing on the timbers (ribs). The wales were all alike and were lined up straight, except for the forward ends, these had to be curved like chair rockers to bend around the bow parallel to the sheer of the hull. Any edgeways bend required in the straight wales could be accomplished fairly easily with clamps and wedges. Very often planks in other parts of the ship could be bent in the same way; this was called "springing" and such planks were called "springers." A ten inch plank thirty feet long could easily be sprung six inches.

From the lowest of the straight wales to the keel the shape of each plank had to be determined separately by taking its contour directly from the hull. Long thin boards, called "rule staffs" were stretched along where the plank was to go and tacked to the timbers (ribs). From one edge of the rule staff, at intervals of a few inches near the wood ends to several feet for the slight curves, the distance to what the plank was to fit against was measured and marked with chalk on the staff, also the required width of the plank at the same points. A plank was selected the shape of which was as close as possible to that indicated by the figures on the rule staff. The staff was then tacked to the face of the plank and the spaces from the edge marked off; a batten would be bent to the markings and the outline of the plank marked off after which it would be hewn to shape.

Planks came from the country just as they were sawed from the logs — they were straight sidewise but the edges followed the contours of the original logs. There was always a shortage of curved planks, which gave the liners

an ever present problem of how much springing any plank they were lining would stand.

When we consider the rather limited range in dimensions of planks the old-time saw mills could supply, the fact that the butts must be well spread out and staggered not forgetting that the grain of the wood must follow quite closely to the shape of the plank, we can readily understand what a highly skilled art plank lining was. Plank liners that became proficient in their line of work were classed with the men who could lay down a ship, in most instances the same men did both.

When a plank for one side was hewn out and tried for "fit" it was used as a pattern for its mate on the other side of the hull. The edges of the planks were beveled so as to leave the seam open nearly a quarter of an inch on the outside. This was for the easy starting of the caulking and to insure that the planks would fit closely together on the inside. Before fastening, the planks are clamped and wedged together as closely as possible, as soon as the exact position of the plank was determined an adzeman dubbed the face of the timbers (ribs), where the plank was to bear so that each plank would have a perfect bearing where it crossed the timbers.

The wales, at their after ends, were trimmed flush with the face of the outside stern timbers, the stern planks were arched to fit the line of the angle between the stern and transom. The ends of the stern planks were trimmed flush with the face of the wales and bulwarks and covered by the "fashion pieces."

Since the faces of the bulwark stanchions were straight, the ends of the stern were straight also, to give a curve to these ends and also to cover the ends of the stern planks "fashion pieces" were used. These were hewn from oak logs so they would fit close to the sides of the stern. They were from eight to twelve inches wide and went from the underside of the main rail down to the lower wales. They were trimmed on the after side even with the face of the stern planking, at a distance they looked to be part of the

stern. The faces of these "pieces" were trimmed parallel to the fore and aft line of the ship, but, vertically, they were carved in such a manner as to give the hull a curved outline when viewed from astern.

The decks were usually fashioned of six, seven, or eight inch pine planks with the main deck of white and the 'tween deck of yellow pine. The edges of the main deck planks were beveled slightly to allow for caulking, the 'tween deck planks were square and were not caulked. The main deck was crowned about six inches but the 'tween deck was level.

The inside of the hull was lined, or "sheathed" from the sister keelson to the main deck with two or three inch hard pine planks which followed in a general way the outside planking and where possible these planks would be wider than the outside planking. A space was left between the upper edge of the sheathing and the bottom edge of the deck clamps. This space, about three inches wide, served for ventilation and as a means to fill between the timbers with salt to prevent decay.

HULL FASTENINGS AND IRON WORK

CHAPTER V

TREENAILS (usually called trunnels) were wooden pins of locust or white oak, split out square and rounded to a size of 1⅛ or 1¼ inches in diameter according to where they were to be used. In the very early days they were hand rounded but fortunately, during the heyday of whaling, there was a special machine invented that would turn them to size. For about two inches the treenails were square, running by concave angle into the round. When fully driven, part of the angle was bedded in the plank, thus keeping the plank from loosening over the treenail when the head was sawed off flush with the plank. The treenails were usually driven all through the woodwork in their wake, the projecting end sawed off, opened slightly with a chisel and a wedge driven in. They were a fastening that required no bunging, they would smooth off perfectly even with the planking, as for their holding qualities – there was and still is only one way a treenail can be removed, it must be bored out.

Treenails were a very important part of a ship's structure, they were less expensive and more durable than iron, because of this they were used wherever possible. Although not as strong as metal bolts, treenails had one tremendous advantage over metal, a wooden pin would not stop, or dull, bits or augers. In a wooden ship there are thousands of fastenings, each requiring a hole to drive it in, hence it was inevitable that some would be encountered when boring holes, especially when fastening to the timbers (ribs) which were made up of two thicknesses pinned together. It was a serious matter if the boring tool struck metal.

In wooden hulls, the greatest strain on fastenings is for the most part crosswise "sheer" and, either to resist sheer or stretching a one inch treenail has about the same strength as a $\frac{3}{8}$ inch bolt, although a bolt would not weaken the timber as much, its smaller surface would be inclined to permit the bolt to squeeze itself loose, thus allowing some of the planks to move on the timber faces causing slack seams where the caulking would work itself out.

Probably first used because of cheapness and availability, treenails, because of their many good qualities and advantages, are still often used as fastenings for the planking of the larger wooden vessels. Where the narrow planks or wales crossed the timbers (ribs), if two treenails were driven, as was usual in whaleships, it was called "double fastened," if four treenails were used it was called "square fastened."

A story in connection with these fastenings has been handed down by a former ship carpenter. During World War I, when there was a great demand for any kind of "bottom," a great many wooden vessels were built for the government and, as with all government projects there were a plentitude of "inspectors" to make certain all specifications were followed to the "letter." One ship building firm claimed their production was held up because the "inspector" insisted that the treenails be square — the specifications read "SQUARE FASTENED" and he refused to allow "round pegs" to be used.

Whatever type of fastenings used in wooden ship construction, be it metal, wood, or a combination of the two, as was the usual case, it was necessary to bore approximately TWENTY THOUSAND HOLES, averaging one inch in diameter and one to four feet deep, in building a ship 115 feet long.

IRON WORK

In general, whaleships had a great deal more forged iron work than did other vessels of comparable size. In addition to the average amount found aboard merchant ships, whalers had trypots, try-works knees, extra chain and hawser pipes, windlass brakes as well as having most of the pendants and blocks hooked or shackled in band-eyes or eye-bolts.

With little difference in the size of whaleships, it was logical that the sizes of many of these items as well as other iron fittings would become standardized. Shipsmiths developed special swages for much of this work and were able to turn out excellent forgings at low cost. It is very possible that these swages and forms may have been the forerunner of drop forging.

The old wrought iron, though not as strong as steel, had tremendously better rust resisting properties. It being fibrous, rust formed on the surface but did not eat in as it does on the crystallized structure of steel. This iron was made from pig iron (cast iron as it came from the smelter) by the old-time puddling process. In this process cast iron is stirred, over and over, on a bed of fine silicate sand; as a result of this "working" much molten silicate gets into the mass. Although hammering, rolling, and forming squeezes out much of this foreign matter, enough remains to entirely fill between the fibres thus encasing the under surface fibres with, what is to all intents and purposes, glass. This "glass" coating of the fibres extended clear through the metal and, no doubt was the primary reason that old-time iron work lasted throughout the entire life of those long lived ships.

BULWARKS AND RAILS WASH-PORTS AND SCUPPERS

CHAPTER VI

THE bulwark planking was fastened to stanchions which were hewn from selected timbers, usually six by eight inches at the deck and tapering to four by eight inches at the underside of the main rail. The stanchions were set between the timbers (ribs), four feet on centers, and extending down four to six feet below the deck. Stanchions were placed aft of the bends, forward of that point their place was filled by the bow cants.

On top of the deck beams and bearing against the inside of the timber (rib) heads and stanchions, were the waterways, usually made from timbers about eight inches square, with the upper inside corner cut to a four inch chamfer, the forward waterways were cut from curved oak logs, the main deck was laid against the square part of the inner side of the waterways, there were no waterways on the 'tween deck, the planks being fitted flush against the ceiling.

On top of the waterways and sheer strake was the plank-sheer, usually a plank of either white pine or oak, four inches thick and about a foot wide; this was cut to the outline of the ship, mortised over the stanchions and bolted down to the sheer strake and waterways. Usually on the inboard side it was even with the upper edge of the waterway chamfer with its (the plank-sheer) upper corner rounded off. Often the plank-sheer projected out past the bulwark planking an inch or more, forming a ribbon from the bow to the stern. At the bend of the bow there was no plank-sheer but its appearance was continued to the stem by a band the width of the plank-sheer. More often than not this projection would be double-beaded for its entire

length. A few vessels had the plank-sheer flush with the planking.

The bottom edge of the bulwark planking usually rested on the plank-sheer. Where the different pieces of plank-sheer met they were scarf-spliced with the ends of the splices centered on stanchions. The planking of the bulwarks, from a short distance aft of the bends to the stern was usually yellow pine 1¾ to 2 inches thick, laid in parallel strips, about six inches wide. The seams were as tight as possible but not caulked, one outside corner of each strake was beaded (a ¼ inch bead). The bulwark bends were of oak, the same thickness as the yellow pine, and were laid so as to be a continuation of the pine strakes. The beading and the seams were in line with those of the after bulwarks, these seams were caulked.

RAILS

The main rails, which were usually of oak, were twelve inches wide and four inches thick, they were mortised over tenons at the tops of the stanchions. The edges of the rails were sometimes double-beaded to match the beading on the plank-sheer, although in some cases the corners were simply rounded. Except at the gangway, on the starboard side, the main rails extended clear around the ship. The rails butted against the knight heads and crossed over the stern parallel with the arch of the deck, where the side and stern rails met they were kneed together. All splices in the rails were long scarfs.

On top of the main rail and extending aft on each side, from the knight heads to at least as far as the gangway and sometimes clear round the ship, was the "chock-rail," sometimes called the "top gallant" rail. This was made of a three or four inch thick plank about eight inches wide, of oak forward and pine aft, set on edge and bolted to the main rail. This was topped by a three by eight inch "cap-rail" that had evenly rounded corners.

On the inside of the main rail was bolted the "pin-rails" made of oak, four inches thick and six to eight inches

wide. The pin-rails were about 16 feet long and each extended aft from about two feet in front of each of the most forward shrouds for each mast. The holes for the belaying pins were usually an inch or one and an eighth in diameter, spaced about two feet apart. Sometimes the after pin-rails extended from just forward of the main shrouds clear back to the after house.

About a foot below the main rail, and running from abreast of the foremast back to the after house on each side of the ship, except at the gangway, were the "lashing rails." These were three by six inch oak joists that were bolted to the stanchions, to these were lashed spare spars, casks, etc.

Spaced in the bulwarks on each side of the ship were the "wash-ports," hinged sections in the bulwarks a foot high and about four inches wider than the space between the bulwark stanchions. The hinges were at the top so the "ports" could swing out if hit from the inside by a sea that might be shipped in a storm. Being hinged at the top, their weight would keep them closed against any force from the outside. There were usually three ports to a side at points where the chains, bearers and davits would not interfere.

"Scuppers," usually three to a side, were oval shape openings cut at an angle through the plank-sheer, to permit the water to run off the deck. These "ovals" were about two inches high by four inches long, with the longest dimension horizontal. They were lined with quarter inch thick lead that was flared over both inside and outside, with the flared edges being fastened with long copper tacks.

CAULKING

CHAPTER VII

CAULKING, though not an actual part of the ship's structure, is a very vital part of her construction. As noted earlier, the edges of the outside planking were beveled in such a manner as to have the inner edges fitting closely while leaving the outer edges open ⅛ to ¼ inch on the face.

The caulking material was always oakum, a loosely twisted yarn about ⅜ inch in diameter, made of hemp obtained from old tarred rope. The tools used were few and peculiar to the caulker's trade. His chief pride and joy was his mallet: this usually had a head of live oak 13½ to 14 inches long and 2 inches in diameter at the ends. For about four inches in the center the heads were about 2¼ in diameter. At each end was a steel band about an inch wide and similar bands, about a half inch wide, two inches each way from the center. Often these bands were made of "german silver." Beginning ¾ of an inch from the end bands and ending ½ inch from the center bands, the mallet was split in halves (a scarf cut) by running a thin saw through it. The caulkers claimed this made the mallet more springy but bystanders said it made the mallets more noisy thus giving the impression of hard work. The handle, a foot long in clear length, was a slightly tapered round stick, usually of hickory, about an inch in diameter, which was securely wedged in a hole through the head. Frequent oiling and hand rubbing turned the wood to a rich brown with a fine gloss; the bands, which were kept brightly polished, glittered in the sunlight as the mallets swung back and forth.

The caulking "irons" were really tempered steel rather than iron and were highly polished. The "ordinary" iron was 7 inches long, 2 inches wide on the edge that tapered in a distance of 3½ to 4½ inches, to a smooth round shank about ⅝ in diameter that ended in a round head about 1¼

inches across. These "irons" varied from 1/32 to 1/8 inch in edge thickness, also they varied in thickness of blade taper. The narrow edge of the blade had a shallow groove its entire length. Each caulker would have six to ten of these so-called "general irons." There would also be special irons to get into corners and odd places, these, generally being narrow, were called "spike irons." Most caulkers had a "reefhook," a thin steel hook welded to the end of a half inch rod 15 or 16 inches long with a strong handle. These were used to dig out old caulking from seams that were to be recaulked.

Each caulker had his "box," a plain wooden box made of thin pine boards, about 10 inches wide, 14 to 15 long and 9 inches high. One side, except for an inch strip under the top board, is open half way down, this being the only opening. The top was usually thinly padded and covered with canvas or leather, the owner sat on the box when caulking decks. In the box the caulker carried his "irons," a shallow tin box of oil soaked oakum to grease the irons to prevent them from sticking in the seams, and a hank or two of oakum.

The caulking iron is held in the hollow of the left hand, grasped by the thumb and three last fingers, and is guided by twisting and bending the wrist. The forefinger is stretched along the face of the iron at its edge and gathers up the proper amount of oakum for each drive of the iron by the mallet. The loose yarn of oakum is laid for 5 or 6 feet along the seam, if on deck, but for the bottom or sides the strand usually either hangs down from the seam or is "caught" in loops a few at a time. In any case, enough yarn is gathered by the left fore-finger to drive to the proper depth, the edge of the iron laid on it then struck with the mallet forcing the oakum into the seam. This gather, twist, and drive is repeated over and over until caulking has been driven the length of the seam.

The caulker can tell by the feel of things just about how much oakum to gather for each blow. His finger not only has to gather the right amount and hold it over the seam ready for driving, his finger also has to give it a peculiar sort of a twist, called "coiling," so the fibers will lie partly

across the seam — otherwise the iron would split through the strand instead of driving it into the seam. It is this left forefinger, and twist of the right amount of oakum that constitutes the great secret of the old time caulkers.

The outside seams usually received three separate strands, filling the seams from halfway through, out to the surface. After the last strand was driven in the ordinary way, it was set about ⅛th inch below the surface by a heavy, long-handled caulking iron, driven by a maul or large mallet. After setting, the seam was "payed" i.e., a thick paint, (usually red lead) was run in by special brushes, called seam brushes. The process for the decks was similar to that for the sides except that only two strands were used and were set about ⅜ inch deep. These seams were "payed" by filling with hot tar or pitch, preferably the latter. A favorite ladle for this purpose being a large winkle shell.

An ordinary whaleship has about two and a half miles of seams to be caulked, three quarters of these requiring three separate strands, with about two inches of each being driven with a single mallet blow. From this one may easily compute that at least 250,000 blows were struck to caulk the average whaleship. Since most of the mallets weighed about four pounds, it is obvious that the caulkers, who swung a million pounds to and fro to make a ship's seams tight, must have developed strong right arms. Of all the ship mechanics, the caulkers made the most noise and had the least to show for their work; they were the only ones who could work seated on a padded seat.

COPPERING

CHAPTER VIII

COPPER sheathing, though not a part of the ship's framework, added so much to the life and safety of vessels that it became almost universal on wooden craft making long voyages. Many are under the false impression that the main purpose of copper sheathing was to keep the bottoms free from marine growths such as barnacles, grass and all the other things that seem to thrive on vessels' bottoms. Copper will not stop these growths nearly as well as many of the so-called "copper paints" as long as they last. The copper content of copper paint is nothing but copper dross, kept soft while underwater so nothing would stick to it, thus it kept clean. It would only last a few months then it must be renewed — an impossibility for a ship at sea. Marine growths of that type were most easily removed by mooring the vessel up river in fresh water. A few weeks in fresh water would cause practically all growths to drop off.

Neither copper or any metal is immune from sea growths, usually called fouling. It is quite common to see copper sheathing covered solid with barnacles, a condition which, although not actually harming the ship's hull, does slow down the vessel's passage through the water. The one important thing that metal does is keep out worms. All the oceans, bays, and salt water harbors, especially in warm or hot climates, are the breeding grounds for wood boring worms, which, if allowed to enter the surface, can destroy a wooden vessel below the waterline in a surprisingly short time.

These worms prefer clean water and are much less active where water is stagnant and dirty such as is found in the upper end of a slip between two piers, this was especially true if a sewer emptied into it as was often the case

in old New Bedford and other seaport towns. Those were the places where the old-time spar makers chose to keep their spar-logs — clean water would have meant their ruin in a year. Although sea worms will not enter wood through any well painted surface, no paint will give full protection for more than six months of service. Just let a space the size of a man's hand get bare in warm waters and the worms will honey-comb that plank a foot each way in a few months time. With a score or so of such bare places a vessel would soon come to an early end.

Something more durable than paint was needed and logically sheet metal was first thought of, and of all metals tried copper proved to be the best. Copper was very expensive so, beginning around 1860, most whaleships were sheathed with "muntz" metal, a composition of about 40% zinc and 60% copper. Among ship builders that was known as "yellow metal," it was nearly as effective and durable as copper with the added advantage of being much cheaper, due to its zinc content. Seldom was the correct name for the metal ever used, it was almost invariably called "copper" and putting it on was called "coppering."

After the seams were caulked and payed the entire bottom, from a foot above the load waterline, including the stem, keel, and rudder, were sheathed over with white pine boards ⅝ inch thick, which were run lengthwise along the vessel. They were fastened with cast composition nails (muntz metal) about 3/16 of an inch square and 2½ long, with square flat heads.

The sheathing was not laid directly on the bare planks of the hull, instead various materials were used between the plank and sheathing, depending on the ideas of the builder. On new ships it was often a thick, sticky substance resulting from the distillation of turpentine, called "bright varnish." Sometimes a fibrous felt ⅛ inch thick was used. On renewal jobs, especially on a very old ship, the sheathing was set in a mixture of "bright varnish" and lime, called "shenan," or in a thin cement mortar.

The copper came in sheets 14 inches wide, 48 inches long and usually about 1/40 of an inch thick. The sheets

were laid lengthwise directly on the face of the sheathing boards, being lapped one inch at the edges and ends, edge seams lapping down, and end seams aft, covering all the pine sheathing except perhaps the upper six or eight inches. The copper was nailed through the laps with cast composition nails, spaced about two inches apart. These nails were round, about 5/32 in diameter by 1¾ long and were pointed but not tapered. They had flat, thin, round heads like belt rivets and were driven with hammers having large flat heads so as not to damage the copper. Usually the top line of copper sheets were fitted around the vessel parallel to the waterline, sometimes the top two would be so laid. The rest of the copper would be run in the best manner to fit the shape of each particular ship, goring and filling pieces being used where needed.

The edge of the stem was covered with sheet lead ½ inch thick, lapping three inches or so on each side and fastened with composition spikes.

The copper and pine sheathing seldom lasted more than two voyages, a period of six to eight years, then it usually had to be entirely renewed. It was from the old copper, melted down, that the brass foundries made most of their composition nails and spikes.

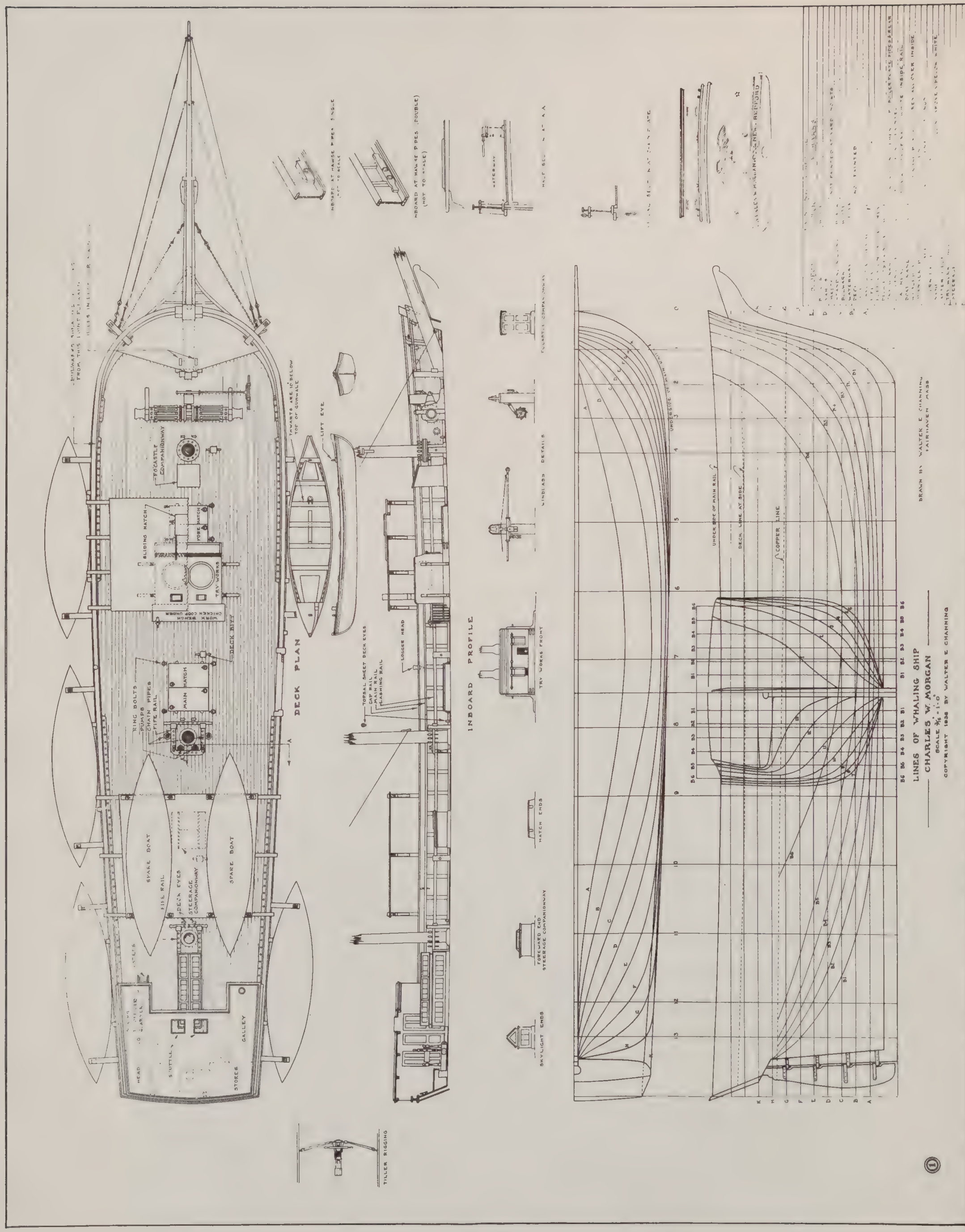
Sea-boring worms could not penetrate metal but if a small piece of copper was accidentally torn off, quite a section of sheathing would soon be so honey-combed that it would wash off taking more copper with it. The planking would then be exposed and in a short time a section of planking would have its strength eaten away, hence whaleship owners were very particular that all submerged wood was thoroughly protected with sheet metal.

CATHEADS, SAMPSON POST, BOWSPRIT BITTS

CHAPTER IX

ON each side of the bow, near the "quickest" part of the turn, were the catheads projecting out at an angle of 45° with the center line of the ship. They were hewn out of specially selected oak crooks and were closely fitted over the main rail and down on the inside of the bow bulwarks to the deck. The outboard section, which overhung about three feet, was about ten inches square with the lower end at the deck being about six by ten inches. The catheads were strongly bolted, often-times with heavy "U" bolts driven through the bulwarks and headed over forelock on the outside and they were braced by the chock rails which butted against them. Near the outer ends were two holes for the "ring stopper" chain, about six inches apart. When the anchor was to be "catted," it was hoisted by the "fish tackle" until its ring was close up to the cathead. The end of the "stopper chain" was passed through the inboard hole in the cathead then through the anchor ring and up through the outer in the cathead. A wedge shaped iron toggle was put through the end link. The slack chain was then hauled taut and belayed (fastened) with cross turns around an inch thick iron rod that was through the cathead inside the chock rail. This projected about eight inches on each side.

To let go the anchor, the iron toggle was driven out by a sharp blow of a hammer, the short end of the "stopper chain" would go through the outer hole in the cathead releasing the anchor ring. The toggle had a small chain fastened to its large end so it would not be lost overboard when driven out of the "stopper chain."



Hull and deck plans of CHARLES W. MORGAN showing waterlines and "station" locations.

Usually the jib and flying jibboom shrouds came to the forward sides of the catheads. Strong eye-bolts through the catheads headed over on the after side were usually put there for that purpose.

SAMPSON POST

The "sampson post" was a strong post of oak, 18 inches square, usually set eight to ten feet aft of the knight heads. It tapered in the fore hold to about twelve inches square and was tenoned into a mortise in the keelson or rider. Where it passed through each deck there was a heavy framing, the post was squared off five or six feet above the main deck. At the underside of the deck, where the post passed through, the post was "fidded" with a cross piece of oak, about four by eight inches, that projected a foot on either side.

Usually the heel of the bowsprit was held by the sampson post but if the post was unusually far aft, or the bowsprit was at an extra steep angle, two posts about eight inches square, a foot or so apart, were set through the main deck and securely fidded. These posts were about three feet high and had a six by eight inch oak cross piece, notched into and bolted to them at a point about eighteen inches above the deck. These posts, which were but a short distance ahead of the sampson post, were called the "bowsprit bitts." The MORGAN has bowsprit bitts, but these were unusual on all but the very old whaleships.

On the forward side of the sampson post was bolted the heavy iron bracket, which held the windlass rocker-bar. On the after side, fitted in bearings cut an inch deep in the post, were hinged the windlass pawls, usually two, one above the other.

SHAPING WINDLASS BARREL

Lacking lathes of sufficient size to shape windlass barrels, shiprights had the barrels "turned" by men pushing and pulling on poles attached to the barrel.

WINDLASS

CHAPTER X

THE revolving part, or barrel, of the windlass was made in three pieces; the central part, two to two and a half feet in diameter and 10 to 11 feet long, with two end pieces, which were the rope barrels, or "nigger heads," two feet long and about the same diameter as the main part.

After the three parts were hewn to approximate size and shape, they would be fastened together by means of center rods. In the center of each end of the main part was a hole about three inches square and two feet deep, into this was driven a slightly tapered square iron rod, that had the middle section turned round for a distance of about six inches. It was these round journals that held the windlass in place and let it turn freely. The rope barrels were fitted on the metal bars in a manner similar to that of the main part. The "barrels" were made of oak. Temporary bearings would be fitted onto blocks of wood on level ground and the roughly formed windlass hung in them where it was free to turn.

When ready to be turned to the finished dimension, a pole, about ten feet long, was bolted to each end near the edge; the windlass would be revolved by men alternately pushing and pulling on these poles. The turner used an adze-like tool by resting its head on a log. The set up, though crude, did turn out surprisingly accurate barrels.

About a foot each way from the center, the windlass was circled by a heavy cast iron band, four inches wide by two inches thick. These were the bands by which the windlass was turned, on their inside were cast six or eight lugs about an inch square. These fitted into slots cut in the windlass barrel, which was turned with the ends small enough to permit the lugs to slide over them so the bands

could be driven into place. On the faces of these bands were cast sprockets, about an inch deep, against which the pawls in the quadrants pushed. In each side of the bands were grooves, a half inch deep by three quarters wide, into which the "lips" on the quadrants fitted.

The quadrants were about two feet long, six inches thick, and 18 inches wide where they lapped over the edges of the sprocket bands, to which they were held by the lips that fitted into the side grooves. The forward ends of the quadrants were about four inches square and were connected to the rocker bar by short rods. The quadrants were actually made of two almost flat castings that were bolted together with their wide ends curved to match the arc of the barrel. In the wide ends, which were loosely hung so as to drop freely, were three pawls, each about six inches long, fitted so as to engage the sprocket teeth when the quadrant was raised but would slide when dropped, this was made possible by having the pawls set so they pointed upwards at an angle of about 45°. Each end of the three sections of the windlass was ringed by a cast iron hoop, about three inches wide and five eighths thick; these were "sweated" on i.e. put on while hot and, as they cooled they would contract thus gripping with tremendous force.

The rocker-bar, which was hung by a heavy bolt an inch and a half in diameter, through the center, had tapered sockets six to eight inches deep into which the windlass "brake-bars" were inserted when the windlass was to be used.

The brake-bars were of iron, 1 to 1¼ by 3 inches and were tapered to fit closely into the sockets of the rocker-bar. There was a three-quarter inch hole through both the rocker-bar socket and the brake bar into which a metal pin could be inserted to keep the brakes from sliding out. Beginning about a foot from the sockets, the brake bars tapered towards the outer ends, being about 1 by 2 inches at that point. The end had a three inch eye through which a wooden cross-bar, four to six feet long, could be inserted to permit several men to work on each end. The brake arms were four to six feet long depending on the ship.

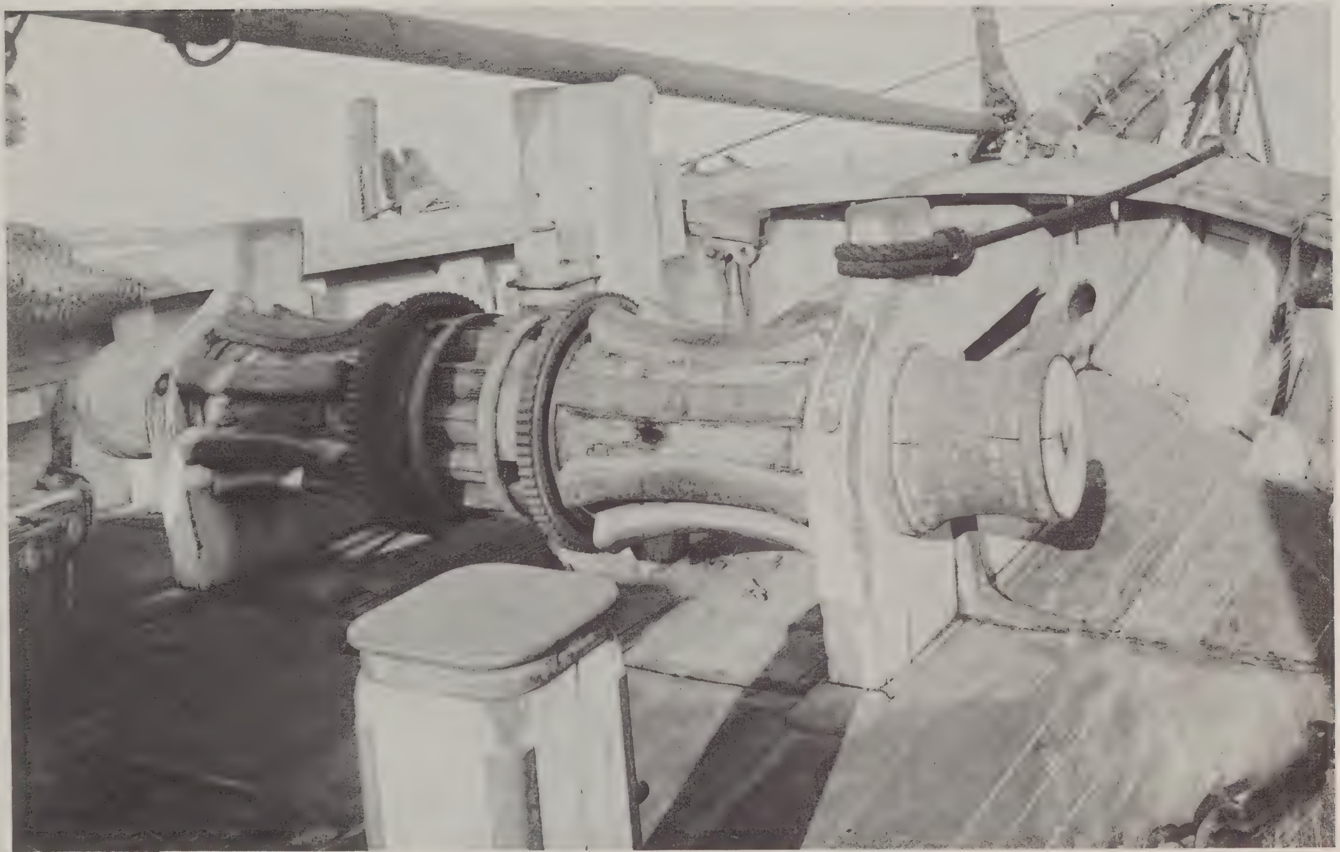
Some of the brake bars were made with the outer end shaped like a flattened "U," with a three inch eye at the end of each "leg" of the "U" for a wooden cross-bar. This latter type came into general use in the middle 1800's.

When one brake was lifted the other went down, thus by alternately raising and lowering the brakes, the quadrants through their connection with the rocker-bar were tilted up and down also. While going up, the pawls in the quadrant set firmly against the teeth of the sprocket band and rotated the windlass a trifle. While going down the quadrant pawls slipped from tooth to tooth so the quadrant actually only did effective work while going up. Since one quadrant was always going up as the other went down, the windlass rotated all the time the brakes were in motion.

On each end of the center section of the windlass barrel were fixed the "whelps," usually eight evenly spaced around the barrel. These were 3½ inch square cast iron bars, about two and a half feet long, that were fitted into shallow grooves and firmly bolted to the barrel. It was on these iron whelps that the anchor chain rested when it was passed around the barrel; the whelps not only furnished a better grip on the chain but they also saved wear and tear on the wooden barrels.

Heavy wooden pawls, two in number hinged to the after side of the sampson post, dropped into iron faced notches cut into the center of the windlass barrel, they held it from turning in the wrong direction because of strain on a hawser or chain. These pawls were of oak about six inches wide and two thick.

The windlass was held in place by windlass bitts, two wooden posts, each about six by twelve inches, that were securely fastened into the deck the exact distance apart as was the length of the center barrel, these posts usually stood about three and a half feet above the deck. On the forward edge of each, about twenty inches above the deck, a cast iron bearing box was set in and bolted, this box took half the turned journal of the windlass axle-



Windlass showing heavy construction.

bar. Directly forward of these two posts was a six inch post, fitted with a bearing box to match that of the after post. Forward of each six by six was a heavy knee, six inches thick, that extended from a foot below the post top to three or four feet along the deck. The six by six posts usually were about a foot higher than the after posts.

When the after posts were set in place and secured in the deck, the windlass was placed with its journals, or axles, in the bearing boxes, the forward posts and knees were then put in position and the posts and knees through-bolted from edge to edge with iron bolts about an inch in diameter. The knees were bolted through the deck to eight inch oak joists set between the deck beams.

Over the windlass and resting on the top of the six inch posts was the "tricing-beam," a four by six or eight inch oak joist, to which slacked turns of one chain could be triced when the windlass was winding in the chain on the other. When a small whale was being "cut-in" the "falls" were sometimes put around the end barrels.

To most observers, the whaleship's windlass might appear to be just about the most clumsy arrangement ever invented by man. It is obvious that if any repairs were necessary the bitts and posts had to be torn pretty much to pieces, this was especially true if the bolts were headed over as was the usual practice. This of course is true but, during all the years of whaling, seldom was there a windlass that didn't last the full life of the ship. Not withstanding its drawbacks, the windlass was a very powerful though simple machine that obviously must have had many good points since it remained, almost without change, the standard machine for heaving the anchors and raising heavy weights for over a hundred years.

Tryworks construction showing Camboose, start of brick work and Trypots.

TRYWORKS

CHAPTER XI

THE tryworks consisted of two large cast iron kettles, called trypots, each of about 200 gallons capacity. These "pots" were enclosed in a brick oven-like affair constructed in such a manner as to permit fires to be built under them to boil (try-out) the oil from the blubber.

The try-pots for the larger ships were about four feet in diameter and two and a half feet deep. Two sides of the pots were partly flat, thus narrower tryworks could be built allowing more space on the deck. The earlier pots had but one flat side on each pot.

Generally, the deck space occupied by the tryworks was about ten feet long and nine to nine and a half wide. On this space was built a water tight box-like tank about fourteen inches deep, called a "camboose" to the whalemen it was a "duck pen." The sides of the tank were of three inch plank, the bottom of two inch planks, the top was open. Two iron straps, three inches wide and a half inch thick, reinforced each corner. In the tank, but leaving a space about a foot wide at the after end, was laid a floor of brick about a foot thick. The bricks were laid in sand so water could circulate around and between them.

On this "floor" was erected the brick supports for the pots and the walls that enclosed them, all the brick above this "floor" was laid in mortar. The upper foot of the walls was "corbeled" in to fit the pots, and the walls which were about a foot thick were securely strapped with iron. The top over the brick corbeling was covered with cement mortar, from one to two inches thick, slanted in towards the pots. In the olden days the cement was the old-time Rosendale and was trowelled very smooth, in later years

sheet copper was laid on the cement with the edges lapping over the rims of the trypots.

The fire doors, made of sheet iron about a quarter inch thick, were on the forward side of the tryworks directly in front of each pot. Each door was about 16 inches wide and two feet high, they were hung by two flat iron hooks over a ⅞ inch iron rod. This rod, which was supported by iron eyes built into the wall about three inches above the door openings, extended almost the entire width of the tryworks to permit the doors to be slid in either direction. The openings in the brick work were about 14 inches wide by 24 high.

About six inches inside the front walls and about the same distance above the brick floor, were two 1¾ inch square iron bars stretching across the fire boxes on which the grate bars rested. These latter were iron rods about ¾ of an inch square with each end bent down about four inches so they would not slip off the bearing bars over which they were hooked. These grate bars were not fixed and often slid sideways leaving a wide open space; usually as soon as a bed of coals was built up the bars were not used.

The chimneys were of sheet iron or heavy copper about 10 by 14 at the base and four to six feet high, being slightly tapered to permit one of the two sections of which they were made to fit inside the other for easier stowing, usually in the trypots. The chimneys fitted over standing collars on top of the tryworks, aft of the pots. Some of the smaller vessels, with their small tryworks had but one chimney, this would be in the center, aft of the pots.

When there were fires under the trypots, the camboose (tank) was always kept filled with water: thus there was about a foot of water and watersoaked bricks between the fires and the deck.

The tryworks was held in place, partly by the camboose, but mainly by four heavy knees, placed two on each side. These knees were usually four inches thick, three and a half feet high and extended out on the deck about two

feet. Each knee was located over a deck beam to which it was bolted. Eight or nine inches below the tops of the knees were ring bolts for lashing things to the side of the tryworks. Forged out of wrought iron, these knees were tremendously strong and thoroughly braced the tryworks. The upright part of the knees was bolted to the brick work.

The tryworks were five to five and a half feet high with the front wall about eighteen inches from the forward edge of the brick filled tank, thus leaving a brick hearth across the front of the tryworks. When "boiling," the fore hatch cover sometimes was slid aft to rest on the hearth, making a wide platform for the men tending the pots to stand on. To avoid having this hatch partly open, with the ever present danger of a man falling down the hatch if the vessel pitched, most ships, in later years, had a platform, the same height, width and length of the hearth, constructed of two inch planks. When not in use this platform would be tipped up onto the hearth out of the way.

As the tryworks were a very necessary adjunct to a whaling voyage, a spare pot was usually carried lashed to the starboard fore corner of the tryworks. It was seldom that a trypot gave out, as they were cast very thick (about 1¼ inches). If by chance a pot did crack the spare would make the difference between success and failure of the voyage.

The top five or six courses of bricks on the front, or forward side, were stepped back so any flame shooting up from the fire would be a distance away from the top of the works, which might have oil sloshing out of the pots. Having this edge a foot or so in, also gave the men handling the dipper, skimmer, and fork better leverage.

On the starboard side of the tryworks was lashed an oil cooler. This was a copper or galvanized tank, open at the top, about two feet wide, three and a half to four feet long, and three or four inches lower than the top of the tryworks, a copper or galvanized "apron," with its sides turned up about an inch, the width of the cooler was hooked over the upper edge of the tryworks to keep the oil from dripping

down between the cooler and the tryworks. In later years most of the tryworks had the two sides and back enclosed in sheet metal a quarter inch thick. In most instances tryworks were rebuilt after every three or four year voyage.

HATCHES AND GANGWAY

CHAPTER XII

JUST aft of the windlass, separated by a space of less than two feet, was usually placed the forecastle companionway, a small house made of planks. This house, about three by four feet and four feet high, was securely fastened over a three by four foot hatch. The hatch was framed by a coaming six inches high by about four inches thick. The house rested on the coaming outside a strip about an inch high and one and a half wide that acted as a stop-water to the seam between the house and coaming. Almost the whole of the after side was open with a pair of doors framed of 1½ inch pine and hung with heavy cast brass hinges. The doors could be held closed by a staple, hasp and pin, though usually they were open and hooked back to prevent them slatting. The forecastle house was so spaced between the windlass and foremast as to allow a clear passage between the mast and house, usually three feet; obviously this did not apply to the MORGAN since her forecastle house, as noted earlier, was abaft the foremast. The roof of this house was constructed of one inch match boards, covered with well painted canvas. The roof of the house would crown crossways about two inches and also slant forward so water would run off. The sides were of 1½ inch thick match boards. On most ships the forecastle house had a two foot square slide on the after end of the roof, this allowed more air and light in the forecastle as well as easier access. The house was lashed to eyebolts in the deck.

Compared to the size of the vessels, the hatches on whaleships perhaps seem very small, that is, they do until it is realized the cargo that was to be stowed below was pretty well "standardized" in regards to overall dimension. Usually the largest and heaviest item to be stowed or hoisted

out was a "ten" barrel cask, these were about 46 inches high and 46 inches in diameter at the "belly," or thickest part.

The hatch openings were framed with heavy timber, and the coamings above deck, always of oak, were usually 6 to 8 inches thick and 12 to 14 high. The coamings were set inside the deck openings and extended down a foot or so below the bottom surface of the deck planking. The coamings were halved together at the corners and strapped with a half inch thick by three wide iron strap. The hatch covers were in two parts, each half the size of the hatch opening; they were made of 2 or 3 inch thick hard pine planks, spiked to cross joists, crowned to the same curve as that of the deck. The cross joists or "carlins" were about four inches shorter than the width of the hatches. The carlins or joists fitted into slots or "gains" cut into the coamings in such a manner as to let the covers lap over on the coamings four inches all around. Each hatch cover had a ring-bolt in two diagonal corners. In later years a few ships had a 4 by 6 removable center beam or carlin that went crosswise in the openings as a center support for the covers. The cross beams fitted into slots or gains. The covers fitted so the edges were even with the outer edges of the top of the coamings. On the outside of the coaming, three inches above the deck, were heavy staples or eye-bolts, usually four to a side. During bad weather a tarpaulin, made to fit closely over the hatch coaming, was used and these staples fitted in slots in the "tarp." Some ships slid an iron rod through the staples, others had a two inch wide by a quarter inch thick strap iron slotted to fit the eyes, wooden pins would be driven through the eyes to hold the straps.

The fore hatch, usually a 5½ foot square opening, was located a foot or two aft of the foremast; the main hatch, about 6 by 7, was usually about two feet forward of the mainmast. Directly below these hatches in the main deck were similar hatches in the lower deck, those hatch covers were level and fitted in flush with the deck.

The "booby" or steerage hatch, about five feet square, was located about eight feet aft of the mainmast, with

coamings about six inches thick and the same in height above the deck. Instead of a flat cover, like the fore and main hatches, this hatch had a low square box made of two inch plank. It actually was a low companionway, about 14 inches high, with an opening in the forward end and top, which was closed by a regular companionway sliding cover on top and a board in grooves at the end.

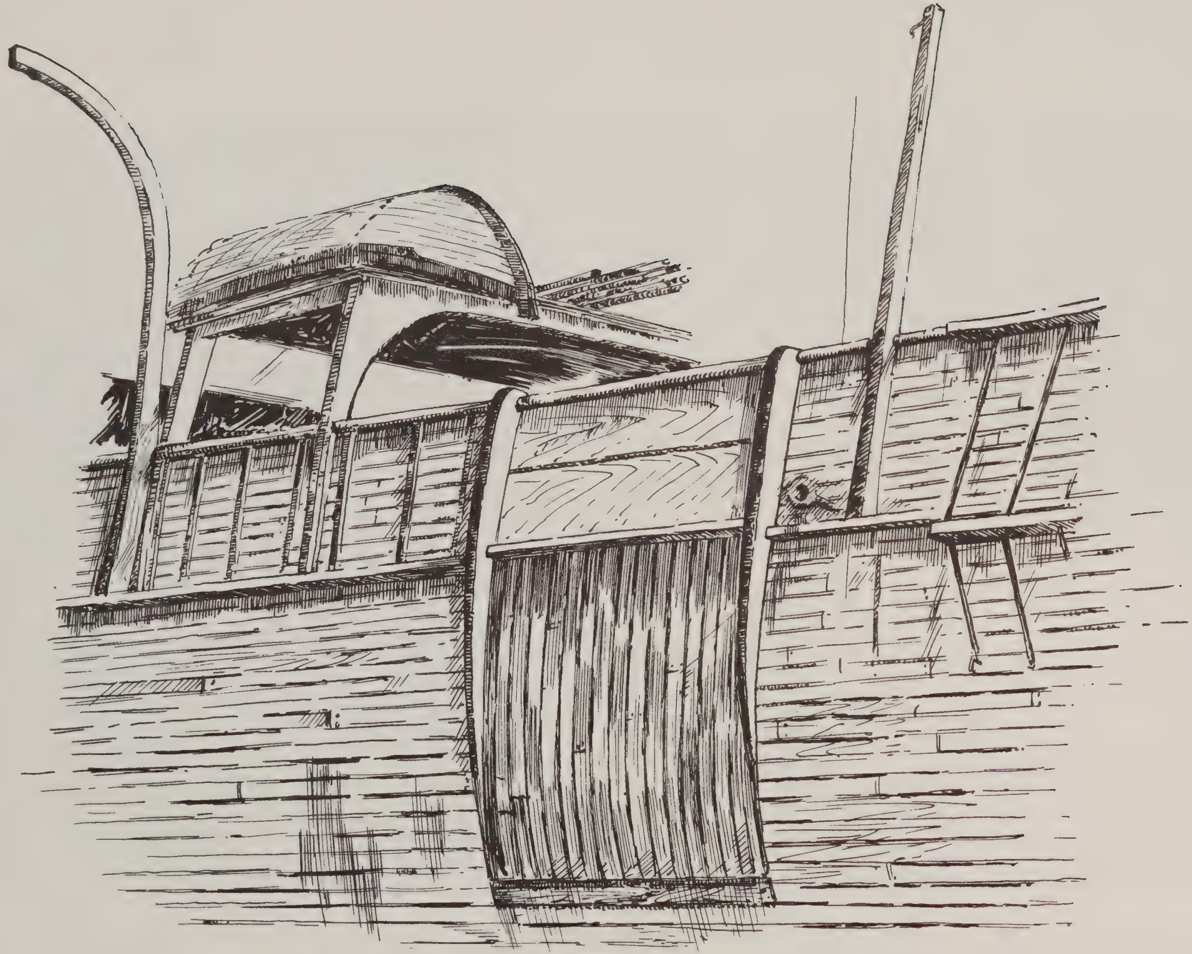
The "box" rested on the hatch coaming outside a raised strip about an inch high which acted as a stop-water to the seam between the "box" and coaming. The "box" was held down by hooks and eyes or was lashed to ring-bolts but could easily be removed so the whole size of the hatch could be used. At the end opening was a set of plank steps, that could be removed, leading to the lower deck that had a small hatch directly under the "booby" hatch.

The "booby" hatch was used, for the most part, by the boatsteerers and boatheaders (petty officers) who lived in the steerage, a room partitioned off between decks forward of the main cabin.

GANGWAY

The gangway was always on the starboard side of the ship directly opposite the main hatch, and was an opening about eight feet wide. The outstanding feature of the gangway was the unusual amount and size of the reinforcing timbers and planks and surrounding fenders. While the construction of the gangway might seem to be unnecessarily bulky, experience had taught that heavy cases, and strips of blubber could deal tremendous blows to the sides of the gangway, especially when cutting in during rough weather.

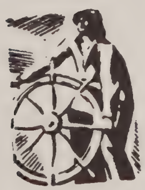
The bulwark stanchions at each end of the gangway were the same as the rest of the stanchions in the bulwarks, outside of these two stanchions were the "bumper posts." These were made of heavy timbers, about a foot square, that fitted closely to the side of and extended down from the cap-rail to four or five feet below the plank-sheer. These timbers were slightly tapered in thickness



Gangway showing bumper posts and heavy protective sheathing.

up and down from the center with the outer corners rounded. A heavy plank sill, four to six inches thick, was fitted between the two bumper posts on top of the planksheer and over-lapping it about three inches. The space between the bumper posts, from the sill to the bottom of the posts, was protected by three inch thick oak planks, placed vertical and spiked to the side of the ship. Below the ends was laid a horizontal plank with its lower edge beveled. All these planks were usually eight to ten inches wide, some ships had two inch oak planking or sheathing over-lapping the top strip of copper about six inches.

The bumper posts were so set as to lap over the stanchions into the gangway, about two inches, thus forming a bearing for the bulkhead which closed the gangway, called "waist-board." This waist-board was made up of matched and beaded planks to match the planking of the bulwarks. It was strongly cleated on the inside and was held in place by heavy slide bolts. To match the main rail was a section the same width and thickness as that rail, this section had a four inch tenon on each end that fitted into a mortise in the main rail at each end. This section of the bulwarks did not have either a topgallant or cap rail.



DECK HOUSES

CHAPTER XIII

ALTHOUGH few, if any, of the very early ships had a shelter deck over the tryworks, those ships going into the Arctic in later years very often had a forward house, as it was called. The forward houses were constructed by setting up three six by eight posts on each side. The posts were "stepped" in large cornered staples of iron, ¾ of an inch square, driven into the plank-sheer, they were also strapped or bolted to the main rail. On these posts about eight feet above the deck were six by eight cross joists. If decked over, though some were not, they would be covered with two inch pine boards. This house would extend from the after end of the tryworks to a point about halfway of the fore hatch. The decking would be about a foot inside the rail. On some ships the upright posts rested on the pin rails or went down to the planksheer inside the rail.

This forward house, although serving as a shelter for the tryworks, was erected primarily to act as a support for the planking that was used to house the ship over when wintering in the Arctic.

Most all of the "square riggers" had a decked over structure, about 16 feet long, located between the main and mizzenmast, called the "boat-bearer" or midship house. This structure similar to that forward was constructed much stronger. This house spanned the entire width of the ship and was constructed by setting up three, six by eight inch posts, on each side, usually placed outside the bulwarks. The posts were stepped in large square cornered staples of iron, three quarters of an inch square, driven a foot into the plank-sheer, the posts were also strapped or bolted to the main rail. On these posts, about seven feet above the main deck, rested the bearer beams of yellow pine, six by eight or ten inches in size. The beams were securely fas-

tened to the posts by hackmatack knees, six inches thick, bolted to both the posts and beams with ¾ inch bolts about a foot apart. The lower ends of the knees often rested on the rails with the upper arms extending two or three feet out under the cross beams.

The decks of these houses were of pine, two inches thick, usually laid with an open space two feet wide on each side. Sometimes the beams were fitted with a six by six inch post at the center. In temperate waters some ships had a four by five "potatoe bin" under this house. The corner posts were usually four by four inches with the sides made up of one by four inch pine boards, spaced an inch apart. The bottom was floored over two inches above the deck to allow an air space. Halfway up in the bin was another floor to divide the weight of the contents. The boards that made up the front of the bin passed through slots in cleats on each side and could be easily removed.

On the boat-bearer was carried two spare whaleboats along with spare oars, boat masts, booms, etc., that were lashed down so as to stay put. Chocks were fitted for the spare boats which were stored upside down lashed to eye and ring bolts. Under the bearer deck were racks for spades, boathooks, etc., a row of hooks usually were spaced on the front side of the forward bearer beam to hang buckets. A two foot square opening with a light hatch cover was in the center of the forward side, directly over the "booby hatch."

Every "square-rigged" whaleship had some kind of an after house, but with no two alike. Generally the sides were built up from the ship's rails and extended forward from the stern 14 to 16 feet. Although the sidewalls were almost always made of matched pine boards, they were constructed in different ways. In some cases the house was fully framed with the boarding laid horizontal; others only had studs at the corners, doorways, and windows, with the boarding vertical. The houses were decked over from outside to outside, except for a recess at the front about six feet deep and ten or twelve feet wide, depending on the size of the house and ship.

Bark PALMETTO showing peculiar house over steering wheel.

In the center of the house, slightly forward of the wheel, was a two by three foot opening usually covered by a small skylight through which the man at the wheel could watch the sails when the ship was "close hauled" or sailing "by the wind." The center of the house for its entire length and for a width of ten or twelve feet was open, leaving narrow rooms on each side with framed and panelled doors. The walls between the side rooms as well as the partitions between the rooms and the open space were of matched boards often strengthened by cross bands of joists or planks. These walls and partitions, as are all permanent partitions, are called bulkheads.

In the starboard side of the house was the galley (kitchen), where the cooking for all aboard was done. It was usually six by ten and contained a large size cook-stove, of much heavier construction than the ordinary kitchen range. There was also a dresser with drawers, lockers and shelves as well as hooks for hanging things. Though crude it provided adequate facilities to cook for thirty or forty men. There was usually enough food, though little variety and no dainties. Aft of the galley was a storeroom though on some of the later ships there was a toilet for the use of the officers in this room. On the port side was the companionway stairs that led to the captain's and officer's quarters below the main deck. Aft of the companionway was a room, that on some ships was used to store vegetables and on others this room contained the captain's toilet. The crew went over the bow and perched on the figurehead braces or martingale stays.

Some of the smaller ships had a raised poop deck, about two or three feet high, to allow head room below; this usually resulted in an after house that appeared all out of proportion with the rest of the ship. The most peculiar of all the after houses was that on the bark PALMETTO, her house was only about six feet square and sat in the center of the after deck. This house was intended simply as a shelter for the man at the wheel but from a short distance it looked exactly like a country outhouse.

THE STEERING WHEEL

CHAPTER XIV

THE rudder stock projected up through the deck about 18 inches and was usually covered with a portable boxing, especially in the old ships; the later ships with the round rudder stock seldom had the post boxed in. The helm or tiller was a white oak timber eight inches square and six feet long. It was fastened to the rudder post by a four inch tenon through the rudder post, an iron strap about ⅝ths thick and three inches wide went around the rudder stock and lapped 18 inches along each side of the tiller. Usually there would be a 1⅛ inch cross bolt through the legs of the strap, the stock and the tenon as well as bolts through the legs of the strap and tiller. Sometimes there was a diagonal strap from the top of the rudder stock to the tiller to keep the latter from sagging. The tiller was usually hung so as to swing about six inches above the deck. Around the forward end of the tiller was an iron band, 1½ inches wide by a ½ inch thick set so as to be flush with the tiller surface, this band had an eye on each side of the tiller.

The steering wheel was mounted on the tiller between two posts. The wheel, usually 3 to 3½ feet in diameter, had three principal parts; the barrel, spokes, and rim. The barrel was simply an elongated hub, eight or nine inches in diameter and about two feet long. In its forward end, the butt ends of the spokes were mortised in. The spokes, usually of locust about an inch and three quarters square, had turned sections between the hub and rim. The outer ends, which projected five or six inches beyond the rim, were turned handle shaped. Some wheels had but six spokes but the great majority had eight.

The wheel rim was made up of three thicknesses or layers; the center pieces, the same thickness as the spokes

and about 4½ inches wide. These were cut to the correct curve (15½ inch radius for a 36 inch wheel), their edges rounded, then fitted between the spokes at the proper distance from the center. The outside layers, usually ¾ thick and 3½ wide with their edges chamfered, were butted together on the sides of the middle pieces halfway between the spokes. The various parts of the rim were generally fastened together with a great many brass screws, spaced uniformly, set deep and bunged. Sometimes, instead of wooden bungs, the screw heads would be covered with diamond or other shaped pieces of brass, ebony, ivory or abalone shell.

The wheel barrel was usually of oak, but would be made of tamana wood, if this was obtainable. This latter wood is very hard and heavy, the color of mahogany, with a close interlacing grain, hence was very difficult to split. This wood was also free from shrinkage checks, it was also very often used for top gallant caps.

The wheel barrel was capped at each end by a turned wooden disc, about ¾ of an inch thick; the disc at the after end being an inch and a half larger than the barrel, to keep the wheel rope from jumping off and jamming between the post and barrel; the second disc, the same size as the barrel, was on the front of the wheel covering the ends of the spokes.

The wheel posts, usually of white oak five to six inches square, were firmly fixed to the top of the tiller by tenon and mortise and were often reinforced by iron straps. They had a turned section between the base and head with a turned rosette at the top. The axle was a brass bolt or rod, about an inch in diameter, resting in brass bushings. On the tiller, just aft of the forward post, was a sliding block with a deep groove so shaped as to fit along each side of a spoke handle to keep the wheel from turning when not in use. This wheel chock was called the "dead man." One spoke handle was usually turned slightly smaller than the others and, when the rudder was centered, the wheel would be rigged so this spoke would be at the top. All bolts, fastening the posts to the tiller and tiller to the rudder

stock, had heads and nuts so as to be readily taken apart if necessary.

The wheel worked the tiller by winding up and unwinding a rope on opposite sides of the barrel. The wheel rope, usually well stretched manila about 2½ inches in circumference was wound six or eight times around the barrel. The center turn, midway between the wheel and after post, was fastened by having a heavy staple driven over it. As the turns were put on they were hauled tight and the ends rove through a leading block on each side of the tiller. Since there were six or eight turns on the barrel the leading blocks could not be opposite each other and because the rope travelled fore and aft, as it wound and unwound on the barrel, there was no fixed position that would furnish a straight lead. Some ships had the lead blocks pivoted to the end of a swivel bar so one swung aft as the other went forward; on other ships the lead blocks were simply "cheek" blocks with their forward ends thicker to allow the sheaves to be at an angle that would give a straighter lead to the blocks on the forward end of the tiller.

The tiller rope after going through the lead blocks and thence to the blocks on each side of the tiller end, went to blocks fastened to the deck with eye bolts and shackles, six or eight feet to either side. The end of the rope went back to the blocks on the end band of the tiller, some ships had an eye bolt on the end of the tiller to which the ropes went. Some ships had double blocks both on the tiller and fixed to the deck. The blocks on the steering gear were usually strapped with metal, often of cast bronze, and had brass sheaves.

As the wheel was turned the tiller swung back and forth carrying the wheel with it and was called a "deck walker" or "shin breaker." The man at the wheel had to be especially alert lest a sea hit the rudder and the slat of the tiller break a leg, more so when the wheel ropes were stretched and became loose. While this arrangement might seem awkward, its advantages, like so many other things about a whaleship, must have vastly outweighed its

disadvantage since it was used with little variation for over a century. The stretch and spring in wheel ropes considerably eased sudden shocks when a cross sea hit the rudder.

An improvement to this type of wheel was constructed on the "brig" SULLIVAN. This vessel had an iron wheel fixed to an eight inch barrel that was "hung" in a heavy metal frame fixed firmly to the deck, just forward of the rudder post. The tiller, which was six feet long, projected AFT from the rudder post; thus the SULLIVAN had the advantage of a winch working a long tiller without the disadvantage of a travelling wheel. Only vessels with a fairly long overhang could have the tiller reversed in this manner. The bark WANDERER, one of the later built ships, had a metal wheel with a worm gear that engaged a quadrant fixed to the rudder post. The great disadvantage of this type was the difficulty of making repairs to the metal parts at sea.

CABIN, STEERAGE AND FORECASTLE

CHAPTER XV

THE captain's and officer's cabins were below deck aft, usually reaching from the stern to several feet forward of the mizzen mast, in all some twenty feet. The after cabin, which was the captain's, was about eight feet long in front of the sternpost and transom case and, was about ten foot wide. The after end was bulkheaded across about three and a half feet high to the top of the transom beam, which was cased over level forming a wide shelf. On each end of the shelf would be a locker reaching to the deck above. Many ships had, on the central part of the shelf, racks to hold two chronometers. In front of the shelf and bulkhead there was usually a built-in mahogany trimmed sofa, upholstered with black hair-cloth. Each end of the sofa was bulkheaded in, forming lockers.

On the port side, between the captain's cabin and the side of the ship, was the companionway or stairway to the deck. On the starboard side aft, the older ships had the captain's toilet with a "dry" sink, forward of this was his stateroom. This was usually a long (about ten feet), narrow room with a clothes closet and either a built-in berth or a weighted, swinging bedstead, hung so as to remain level when the ship rolled. Over the berth was a "telltale" compass, so the captain could see how the ship was heading without getting out of bed.

The forward cabin was the same width as the after cabin but much longer, usually 12 to 16 feet in length. Across its forward end, on the starboard side, was the cabin or steward's pantry, hardly more than a large cupboard, it being but four by six feet. To the port of the pantry was a door in the bulkhead that gave access to the 'tween decks.

In the center of this forward cabin was the dining table, usually made of hardwood, often mahogany, securely fastened to the deck. A removable fiddle rack was kept handy for use during stormy weather to keep the dishes from sliding off. The vinegar cruet, salt, pepper, sugar, etc. were in a rack, hung from the deck above, that would swing when the ship rolled. On each side of the forecabin were staterooms for the officers; on the starboard side, forward of the captain's, was that of the second mate; on the port side there was one for the first mate and another, with two berths, for the third and fourth mates, who roomed together. The mate's room usually had a small desk as he generally kept the ship's log.

The cabins were well lighted and ventilated by a large skylight, four feet by ten or twelve long, located so about a third was over the after cabin, the windows were so arranged that they could be opened independently over either cabin. Each stateroom had at least one four inch porthole. Usually there were grilles of open jig-saw fretwork above the doors. There were always plenty of whale-oil lamps available, those in the after cabin often being quite elaborate of lacquered brass. The woodwork, although plain, was neat and substantial and was kept well painted.

The steerage was 'tween decks, forward of the cabin. It was the quarters of the petty officers; i.e. the harpooners (called boatsteerers), carpenter, cooper, and steward. It was a rectangular space, about 10 by 14 feet, bulkheaded off from the hold. The location of the steerage varied on different ships; the MORGAN'S for example was on the starboard side while that of the ALICE KNOWLES was on the port side.

The forecastle was a room between decks at the extreme bow, usually running back to the foremast and sometimes beyond, as on the MORGAN. On the average it was about 18 feet long and twenty or more feet wide at the after end, depending on the shape of the ship's bow. Its walls were the sides of ship and it was separated from the

rest of the 'tween decks by a bulkhead of planks. Its ceiling was the upper deck and its floor the lower deck.

There were eighteen to twenty-four berths, each a little better than six feet long and two wide, set in double rows, one above the other, along each side. The four bunks in the extreme bow sometimes were narrow at their forward ends. Set into the upper deck to furnish light was usually four prismatic lights of thick glass, each about 3½ inches in diameter. The main source of daylight, and the only means of ventilation was the companionway, the doors of which faced aft and could nearly always be kept wide open. The forecastle was well painted and the crew could easily keep it clean. Each man had a berth to himself, his own mattress and bedding as well as a place for his sea chest.

DAVITS, BEARERS, CRANES, SLIDES

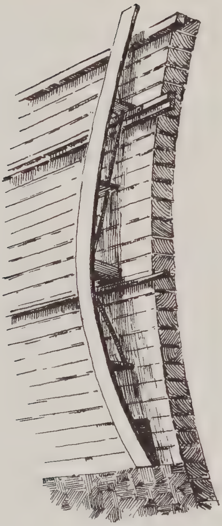
CHAPTER XVI

UNLESS hull down below the horizon, a whaleship could always be recognized as such by her boats. No other sailing vessels, except men-of-war, carried such a line of boats hung from davits on each side. Although over the years whaleboats increased a little in size (from 28 to 30 feet in length), the ponderous wooden davits remained the same for over a hundred years. This, no doubt, was because the original idea was just right for the purpose intended since a well made set of davits lasted as long as the vessel for which they were made.

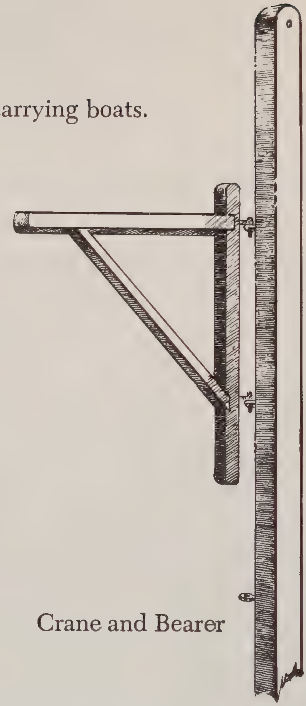
The typical davit was of selected white oak, about eight inches square, with the butt end of the tree used for the top end of the davit. About two feet of this butt was hewn slightly curved, the rest of the log left straight. After being hewn to size, the part to be bent was split into three thicknesses by sawing up from the opposite end six or seven feet, with the two cuts ending at the hewn curve (about three feet from the end). The cuts were made with a thin whip-saw. After this partial splitting the stick was thoroughly steamed and clamped over a form made for this purpose from a large curved log. In bending, the outside layer would draw away from the end, the middle layer would slide past the outer layer with the inside sliding past the middle layer. When the davit, on its form was cooled, it was bored through in eight or ten places (the holes usually staggered) along the bend and treenails driven through, this prevented the bend from straightening. During the bending the saw kerfs closed tightly and, after the davits were planed smooth, the cuts were hardly noticeable.

In the upper end, which was left solid with the curve hewn in, were three through mortises an inch wide and

Gear for hoisting and carrying boats.

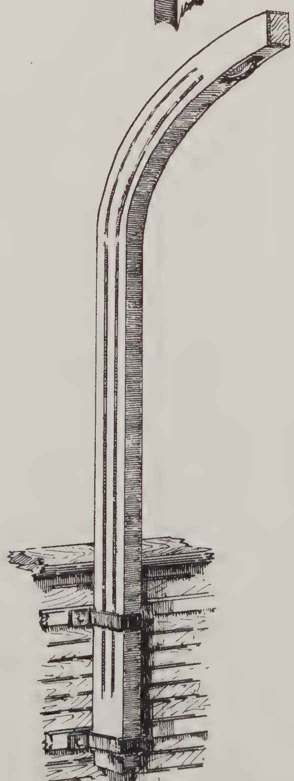


Slide to prevent boat rubbing on ship when being raised or lowered.



Crane and Bearer

"Stiff knee" Davit



Curved Davit

seven or eight long. In these slots or mortises were set lignum vitae sheaves for the upper loops of the boat falls.

In later years, davits were constructed by framing a nearly horizontal arm into the upright post and fitting a heavy knee into the angle. These "stiff knee" davits, as they were called, were no doubt made that way because of the lack of bending facilities. Although just as strong as the curved ones, they were clumsy in appearance, lacking the graceful curve of the older davits.

Generally there were four davits for two boats on the starboard side and six on the port for three boats, each pair being spaced twenty-two feet apart. Each was stepped on a tapered block at the underside of the planksheer and held in place by a square iron staple, made of ¾ inch iron. The heel of the davit was usually cut away the thickness of the staple so that the latter was flush with the surface of the davit. The ends of the staples were driven a foot into the planksheer and at the rails the davits were held by flat iron straps, about 1½ wide and ½ thick where they passed around the davit. The ends of these straps were rounded so as to be ⅞ inch in diameter and passed through the main rail where they were headed over forelock on the inside. The upper ends of the davits were about nine feet above the rails and were braced fore or aft by iron rods.

With each pair of davits were two lashing posts or bearers, these were of oak about six inches square at the rail, tapering to about four inches at the top, which were seven or eight feet above the rail. They were stepped and secured to the rail in a similar manner as the davits, it was to these that the boats were lashed when they were hung from the davits.

To each bearer was hinged a strong triangular shaped bracket, called a "crane," that was framed of three by four inch oak. They were about three feet high and projected out from the side of the bearers about the same distance. The hinges were of the "pintle and gudgeon" type and were on the sides facing towards the davits. The pintles were of ¾ inch round iron, standing straight down about three

inches. The shanks, which were level, passed through the upright posts of the cranes and extended along the upper or level arm, the bottom pintle extended along the brace or diagonal arm. The ends which extended about eight inches along the arms, were flattened and through-bolted.

The gudgeons were eyes formed of ¾ inch square iron with tapered shanks that were driven clear through the lashing posts and headed over forelock.

Each crane had two pintles and each post or bearer had three gudgeons, so arranged that when the cranes were held by the middle and upper gudgeons, or upper cranes as it was called, the level arms were two feet above the bulwark rails. These were used in bad weather. When the middle and lower gudgeons were used the cranes were about two and a half feet lower, they were used in this position most of the time. The cranes were held in position, when swung out by iron rods which were hooked into eye-bolts in the davits and were fastened to the cranes by a double-eye. When lowering boats the cranes were swung in to the ship's side.

Just inside the bearers were the slides, one by six inch oak boards that extended from the rail to just above the waterline. These slides curved out over the channels and were reinforced by spacers made of two inch thick oak blocks. The slides were so spaced as to prevent the gunwale of the boats from rubbing against the side of the ship while being lowered. The weight of the boats, when hoisted and lashed to the bearers, was not carried by the davits but by the cranes thus distributing the boat's weight fairly evenly.

BITTS, BELAYING PINS, FIFE RAIL, CHAIN PIPES

CHAPTER XVII

WHALESHIPS had some arrangements for hitching to, that were peculiar to them alone. Just forward of the main hatch, also just aft of the booby hatch and usually in line with their starboard coamings, was a post about a foot square, standing 1½ to 2 feet high. There was a similar post located to starboard of the foremast about a foot and a half away. About ten inches below the top of each post was a through bolt or rod about 1¼ inches in diameter, that projected eight to ten inches on each side. In general these rods were fore and aft in the forward and after bitts but athwartships in the midship bitt. From about four inches above the bolts to within an inch or two of the deck the post corners were protected with angle irons ⅜ths thick that lapped 2½ inches on the faces of the bitts. These bitts usually extended down through both decks to the floors, where they passed through the decks there was heavy framing. Forward was the "fluke chain" bitt, amidships the "belly chain" bitt and aft was the "head chain" bitt. These bitts were usually made of oak.

In the starboard bulwarks, opposite the forward and after bitts (the gangway was opposite the midship bitt) was a very heavy cast iron chain pipe. Where these "pipes" passed through, the bulwarks were reinforced on the inside by an oak plank eight inches thick by a foot wide, which were cut between the stanchions and lapped partly on them, these reinforcing planks rested on the planksheer. Since the strain on these "pipes" was often very heavy the woodwork was made extremely strong and was bolted securely. Usually there were chain pipes on the port side opposite those on the starboard, often the port pipes were not as

heavy as the others. At the forward end of the waist or gangway was bolted to the sill a heavy cast iron, horned fairlead for the "belly chain." Some ships had an extra chain pipe on the starboard side opposite the forward bitt and below the forward chain pipe in the bulwarks. This extra chain pipe was put there especially to handle the fluke chain when a whale was alongside. This pipe angled down partly through the planksheer making a straighter pull and thus easier handling of the fluke chain.

Practically every ship had a heavy fife-rail around the mainmast, often one at the mizzen but seldom one at the foremast. Masts without fife-rails usually were fitted with a heavy iron-banded, wooden collar to hold belaying pins. Sometimes iron spider-bands took the place of the wooden collars and sometimes there would be a spider-band above the fife-rail.

Inside the main fife-rail, and a foot or so abaft the mainmast, were the bilge pumps, usually two. In the early days the pump were bored from pine logs, though in later years they were made of cast-iron pipe. With the wooden pumps the supports for the brakes stood on pintles fitted to holes in the top of the fife-rail. The pumps were cut off a few inches above the deck with a large notch on the outside to direct the water towards the sides of the ship. With the advent of the cast iron pumps the socket for the pump brakes was hung on a pintle on the pump itself. Usually there was a check valve a few inches up from the bottom and another about ten inches below the top.

Aboard a whaleship, pumping ship was a ritual performed without fail (except in a severe storm) at exactly the same time each day. When blubber was on deck a canvas trough was used to lead the water over the side. By counting the number of "strokes" the captain could determine if the vessel was "taking water" and by watching for any "oil slick," brought up by the pumps, he could tell if an oil cask had sprung a leak.

Just forward of each square rigged mast, two heavy eye bolts went through the deck and the deck beam, they

were spaced about a foot apart. They were made of $\frac{7}{8}$ to 1 inch iron with eyes about $2\frac{1}{2}$ to 3 inches in diameter. It was through these eyes that the chain topsail sheets were led. The sheets went from the yard arms to the sheet blocks at the center of the lower yard thence to the eyebolts and from there up to the nearest pins, usually of iron, on the forward part of the fife rail. Ships of the 1850 period had single topsails which were sheeted out by hand while the topsail yard was down, the sheets would become very taught when the yard was swayed up by the jig on its halyards. Double topsails did not come into general use until the 1870's.

Most of the belaying pins were of locust, but some like those holding the topsail sheets that had to bear heavy strains were of iron. Pins along the bulwark rails, subjected to extra strains, usually had a cast iron chock bolted to a stanchion or the lashing rail below, the lines caught under these chocks and brought up to the pins helped equalize the pull of the lines that led directly from aloft.

CHAIN PLATES, BACKERS, CHANNELS, LOWER DEADEYES

CHAPTER XVIII

THE chain plates, which hold the lower deadeyes, were made of round iron, 1 to 1⅛ inches in diameter. About three feet from one end, the rod was bent to a circle to fit in the score of a deadeye. About five feet below this "eye," which was about five and a half inches in diameter, a second eye, about 1¼ inches in diameter was formed. This brought the two parts of the rod side by side with their ends lapped. These ends would then be cut off and welded together. This formed a long link with a large eye at one end and a small one at the other. The two sides from eye to eye were pressed close together and since the chain plates were set in line with the shrouds each was of a different length, these lengths were either taken from a rigger's draft or from the ship itself.

Practically all the chain plates had backers at their lower ends; these were welded links about a foot long with the sides shut together, leaving an eye about 1¼ inch in diameter at each end. The chain plates were fastened by placing an eye of the backer over the small eye of the chain plate and driving an iron bolt through both eyes and the side of the ship. A second bolt was driven through the lower eye of the backer; thus each chain plate, although having but one eye to bolt through, actually was held by two bolts. The backers were made of ¾ inch round iron rod. The bolts were of 1¼ inch iron rods and were driven clear through the vessel's side and left so they might easily be found so they could be driven out if their removal became necessary. The chain plates and backers were made of such lengths and so located that their fastening bolts went through planking, timber (rib), and clamp, a total of 14 or more inches of wood.

From the point where they were fastened to the ship's side, the chains were bent out and passed over the edge of planks called channels. These were made of oak plank, six inches thick and from eight to twelve wide, securely bolted to the sides of the ship at the level of the planksheer or sometimes just below it. The outside edge of the channel had shallow, rounded notches for the chain plates to fit into and stay in place. A strip of three or four inch oak, with notches to match those in the channel, were spiked on over the chain plates. From the channels, the chain plates were bent in until they rested against the edge of the main rail where they were secured with strips similar to those on the channels. The strips holding the chain plates would be rounded or beaded to match the main rail and planksheer.

The lower deadeyes were usually of lignum vitae wood, six and a half to seven inches in diameter and about four and a half thick. They had a semi-circular groove or "score" to fit the eye of the chain plates, nearly all around the outside edge. The score began and ended near the bottom of the deadeye but did not quite meet thus preventing the deadeye from turning in the eye of the chain plate. In later years some "cheaper" deadeyes were fashioned of oak but these were more likely to split than the others of lignum vitae.

The chain plates were placed so the deadeyes were about two inches above the rail. The deadeyes were put in the chain plates before the latter were put in position; the large eye was heated and opened until the deadeye could be slipped in, when the eye was closed it was immediately cooled by dipping in water. It was considered to be an exacting job to set deadeyes, but good shipsmiths could set "eyes" without a scorch mark. The heads of the chain plate bolts were fitted in the eyes much the same as screw heads fit in wood, the projecting end's were rounded over neatly.

Many ships had a six inch hole just below the main channels, one on each side abreast of the mainmast and

fitted with a wooden plug. These holes were used when the ship was to be hove down. Preventer chains or cables could be run from the main-top through these holes and be secured so as to take much of the strain off the mast and shrouds.

FIGUREHEADS AND STERNBOARDS

CHAPTER XIX

THERE were three general classes of figureheads; those representing full figures, busts, or heads of persons; those which featured a scroll that wound backwards towards the bow called "fiddleheads;" by far the most numerous were those which featured a scroll that wound outwards, called "billet heads." Not so numerous were figures of animals or birds. The figurehead knee, usually called the "cutwater," was built up of tapered logs, bolted to the stem and to each other, usually with the outside pieces made of long lengths of naturally curved lumber. Beginning with the thickness of the stem, the cutwater gradually thinned to between four and six inches. The cutwater usually had one main brace on each side which, starting at the figurehead and running back nearly straight on top, curved into the planksheer about four feet each side of the stem. These braces tapered from about four by six inches at the planksheer to about three by six at the outer ends. Sometimes the braces were kneed to the cutwater for two thirds of their length by natural crook knees spaced about three feet apart.

Below the figurehead braces were usually two others called "flying braces." These were directly against the head knee and were flared back like two huge bands on the bow about four feet. Beginning at the figurehead, the upper one was usually scarfed to the flying brace as though they began as one. These braces or bands swept back to the bow in slightly diverging curves, at the figurehead they were about three by two inches and gradually increased to about eight by eight in the curve at the wood ends. They were about eight inches apart at the start and a foot and a half apart at the bow. The space between, where they lapped on the bow, was filled with four inch

plank for extra support to the hawser pipes. Any trail board or carving aft of the figurehead was between these lower braces or bands.

On some of the very early whalers there was another pair of flying braces below the first set. They were about the same size as the upper ones and began directly under the ends of the others. These differed in that they were in the shape of an inverted arch, the center dropping two or more feet from a straight line. This second set of flying braces was confined to the very early ships and is mentioned because of the fact that some photographs of the older ships show the extra flying braces.

STERNBOARDS, ETC.

A whaleship's stern was much like the end of a box whose sides slanted in about ten degrees from the vertical. Its width was a little more than twice the height; the top and bottom was arched about six inches and it bowed out crosswise about a foot. Its ends were straight lines and its four corners were angles but this harsh oblong look was hidden and given a more graceful contour by the fashion pieces.

Even though the stern was part bulwark and part hull, no separating line was shown; the entire stern from transom to rail was planked in a uniform manner, all planks being alike. The meeting line of the stern and transom was nearly always marked by a half round ribbon, two inches wide. About eight inches above this and parallel to it was a similar ribbon; in the space between was painted, though sometimes carved, the ship's name and home port.

Some of the old ships had two small windows, about 18 by 24 inches, in the stern (the MORGAN had four). The sash was hinged so as to swing up inside while outside was board shutters that could be swung up and held by lanyards (small rope). Many of the later ships had two eight or ten inch port holes instead of windows in the stern.

Besides the figurehead and the trail boards at the bow, many ships had ornamented sterns. Usually this was in

the form of a thin plank cut to oval curves, generally with cap mouldings, that spread the entire width of the stern starting from the ribbon over the name space. The arch was always very much deeper at the crown than at the ends.

Some of the arches were perfectly plain, others were faced with carvings in bold relief. When carved the greatest mass was centered at the crown and might be an eagle, shield, or the head and shoulders of a person. The center pieces were usually flanked by carved tracery, which gradually diminished as it flowed down to the sides. Sometimes, instead of the arch, there was, as on the MORGAN, a large spread eagle.

Whaleships had very little purely ornamental work such as often decorated merchant ships and naval vessels. Most of the carvings were the work of local carvers, who did little else but carve ship ornaments. Although their carvings did not compare with the sculptures of the old masters, their figureheads answered their intended purpose and were sturdily built to withstand the buffeting of heavy seas. From a purely artistic point of view the carved scrolls that decorated the billet heads and trail boards were unexcelled.

SPARS

CHAPTER XX

WHILE photographs give a general idea as to relative sizes, they cannot be scaled so as to give exact dimensions. The following are the dimensions for most of the spars of a ship rigged whaler and can be considered as average. The bowsprit and lower masts were generally of local white pine, with all other spars of spruce.

The bowsprit at the knightheads was two feet square with an outboard length of 21 feet. It is worked from a square at the knightheads to octagonal at the figurehead then rounded to the end, except that the flat of the octagonal was retained at the top, out to the cap.

Jib and flying jibboom, in one stick, 13 to 14 inches at the bowsprit cap, 23 feet to the outer band with about 2½ feet pole end.

Foremast, 22 inches at the deck, 32 feet deck to shoulder under the tops (trestle trees), head 9½ feet.

Fore topmast, 14 to 15 inches at the foremast cap, 21 feet cap to shoulder under crosstrees, head 6 feet.

Fore topgallant mast and royal mast, in one stick, eight inches at the topmast cap, 28 feet cap to royal shoulder, 5 feet pole end.

Fore yard, 14 inches at the slings, 48 feet between shoulders, pole ends 3 feet.

Fore topsail yard, 12 inches at the slings, 36 feet between shoulders, 3 feet pole ends.

Fore top-gallant yard, 8 inches at the slings, 25 feet between shoulders, 2½ feet pole ends.

Fore royal yard, 4½ inches at the slings, 21 feet between shoulders, 2 feet pole ends.

Mainmast, 22 to 24 inches at the deck, 34 feet deck to shoulder, 11 feet head.

Main topmast, 14 to 15 inches at the main cap, 22 feet cap to shoulders, 6 feet head.

Main top-gallant and royal mast in one stick, 8 inches at the top mast cap, 29 feet cap to royal shoulder, 6½ feet pole end.

Main yard, 14 to 15 inches at the slings, 50 feet between shoulders, 3 feet pole ends.

Main topsail yard, 12 inches at the slings, 38 feet between shoulders, 3 feet pole ends.

Main top-gallant yard 8 inches at the slings, 28 feet between shoulders, 2½ feet pole ends.

Main royal yard, 4½ inches at the slings, 22 feet between shoulders, 2 feet pole ends.

Mizzenmast, 15 to 16 inches at the deck, 36 feet deck to shoulder, 9 feet head.

Mizzen topmast and mizzen royal masts in one stick, 10 inches at the mizzen cap, 34 feet cap to upper shoulder, 6 feet pole.

Mizzen yard, 10 inches at the slings, 32 feet between shoulders, 3 feet pole ends.

Mizzen topsail yard, 10 inches at the slings, 26 feet between shoulders, 2½ feet pole ends.

Mizzen top-gallant yard, 8 inches at the slings, 19 feet between shoulders, 2 feet pole ends.

Mizzen royal yard, 4½ inches at the slings, 18 feet between shoulders, 2 feet pole ends.

Spanker gaff, 7 to 8 inches greatest diameter, 22 feet mast to shoulder, 5 feet pole end.

Spanker boom, 8 to 9 inches greatest diameter, 30 feet mast to shoulder, 2 feet pole end.

Note — The length of the spanker booms and gaffs varied, depending on the location of the mizzen mast.

Dolphin striker (martingale), 6 inches largest diameter, tapering to 4 inches at each end, 8 feet long.

Sprit yard, 4 inches at the center, 15 to 16 feet between shoulders, 12 inch pole ends.

Masthead and bowsprit caps or "withes," as they were often called, were of wood banded with iron. They were set level on the masts, but with the rake of the foremast on the bowsprits.

Around 1870, whaleships began setting split topsails, upper and lower. The lower topsail yards, 12 inches at the slings, 40 feet between shoulders on the fore, 42 feet for the main, 3 feet pole ends.

Originally most of the ships built for whaling were ship rigged, i.e., square sails on all three masts. Over the years it was proven that bark rigged vessels (square sails on but two of three masts) had advantages that far outweighed the possible loss of a knot or so in speed; whalers were seldom, if ever, in a hurry. This change from ship to bark rig necessitated a slight change in method of rigging.

Whalers' quarter boats prevented the main braces from going direct to the main rails, usually on barks they went first to a cross-jack "crotchet" yard, then to the main rails. This cross-jack yard was a spar about 9 inches at the center and tapered to about 6 inches at the shoulders, with very short yard arms, about 28 feet between shoulders, 2 foot pole ends. The yard is securely fastened to the mizzenmast by a saddle and iron band.

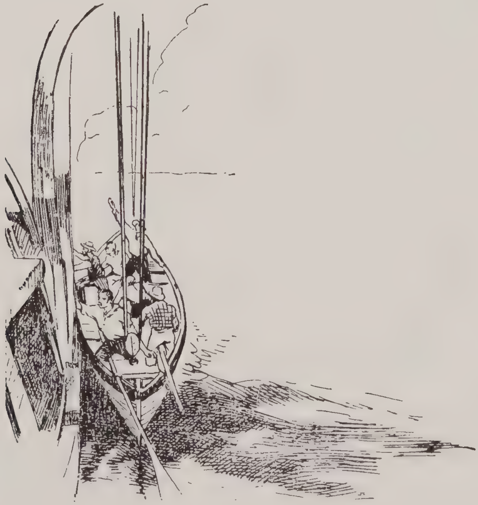
The cross-jack yard had strong permanent lifts, and also heavy single braces set up by hearts and lanyards to chain plates at the after corners of the deck house. These plates usually extended down a few feet below the deck house and were fastened to the stern.

The arrangement of purchase and lead blocks on the yard varied greatly on different ships; sometimes the standing ends of the main braces were fastened to the mizzen stay and sometimes halfway out the yard, the pulling ends led from near the yard ends direct to the rails. The cross-jack

was hung about level with the main yard. Bark rigged vessels were the only ones to have a cross-jack yard.

The few barks without cross-jack yards usually ran their main braces from the mizzen stay to pendant blocks on the main yard and from there to blocks on the after davits, usually just below the beginning of the bend. This also was the usual arrangement on ship rigged vessels.

If the purchase of the main brace was double (as often was the case) the standing end was fastened to the yard pendant block and one double or two single blocks on the cross-jack yard were used for purchase and lead. If the same purchase ran to the davit, a double block was used at the davit and the pulling part led alongside the house to the pin-rail.



C. E. Beckman sail loft about 1904

John DeWolf
Thomas Manchester
Frederick Hathaway
Walter Maker

C. E. Beckman
Otto Newman
Walter Cook
William Wally
Frank Taffe

Benjamin Lawton
J. W. Durant
Nicholas Taffe

SAILS

CHAPTER XXI

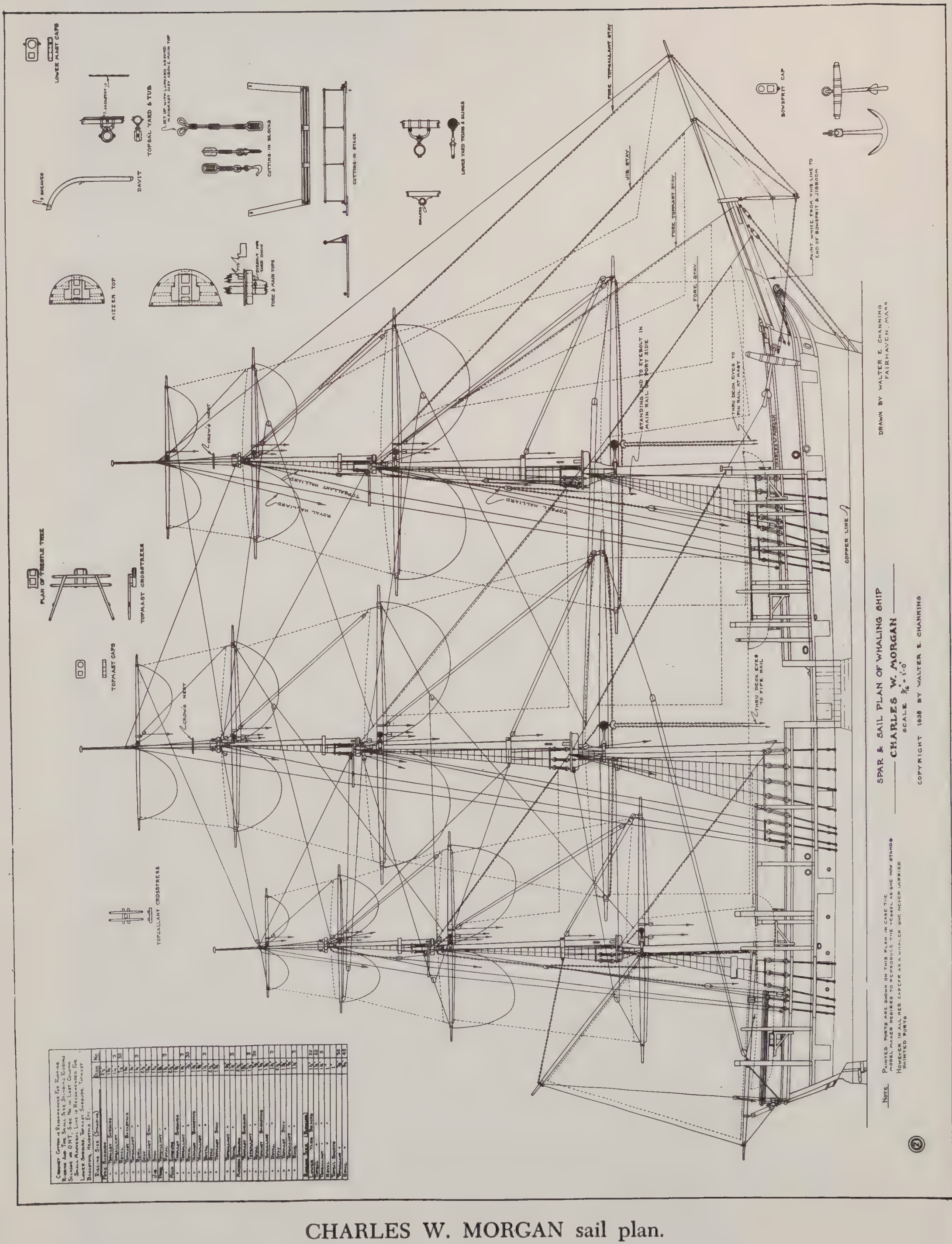
LAYING out and cutting sails required such a large floor area that sail lofts were usually situated on the upper floors of buildings, more often than not they were in the attic. Any stoves, for winter heating, were on a metal covered platform that was hung from the rafters, usually about two feet above the floor.

Because they had to cope with conditions they could not fully foresee, the sail makers, of necessity needed great skill and intelligence. Making sails by hand was tedious work, especially in the days when all seams were hand sewn. Even with the advent of the sewing machine much of the work can only be done by hand, one stitch at a time — even with all our vaunted technological advances of the twentieth century, no one has invented a machine to sew the bolt-rope to a sail.

Since so many of the dimensions listed have been taken from the CHARLES W. MORGAN it might be well to give the dimensions, as well as a description of the last suit of sails made for that vessel, when rigged as a ship. This "suit" consisted of twenty sails that required a total of over 2,100 yards of twenty-two inch wide canvas of varying weights. These plus a storm trysail, that no whaler would go to sea without, would cover an area of more than 11,000 square feet.

Ropes at the head and foot of the sails were usually of hemp and the bolt-ropes in the leeches were usually of the best quality manila that was manufactured especially for this purpose.

Standard 22 inch wide canvas was used, the seams had a one inch lap. Those sails with reef points had them in every seam; three feet long on the forward side of

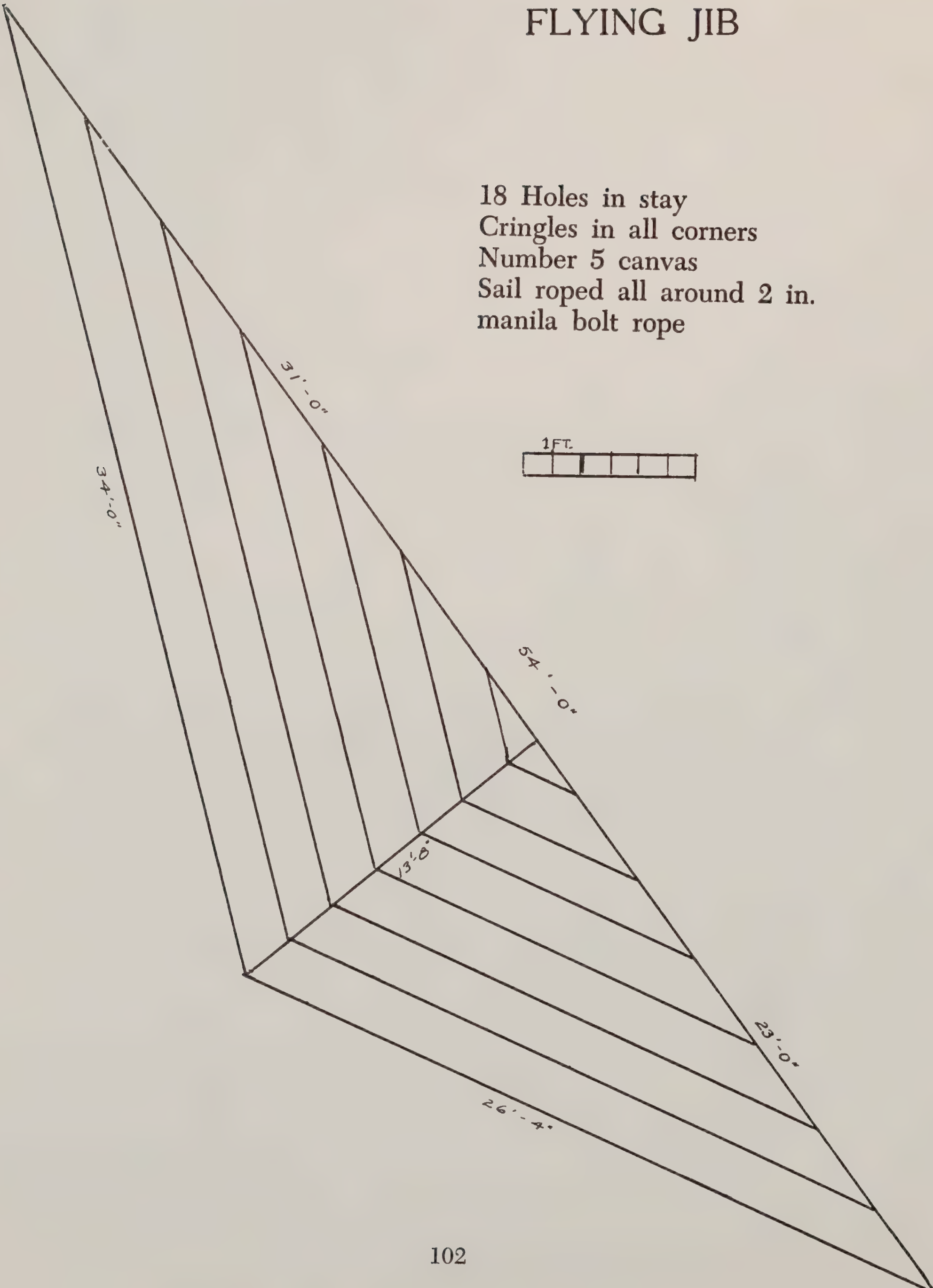


CHARLES W. MORGAN sail plan.

the sail and four feet long on the after side of the topsails for the first reef, with those for the second reef being six inches longer; half inch diameter rope was used. The holes were galvanized rings worked in with canvas backing at the reef points, one foot wide, the same weight of canvas as the sail. The square sails had a chafing strip of canvas, the same weight of canvas as the sail, that paralleled the clew lines.

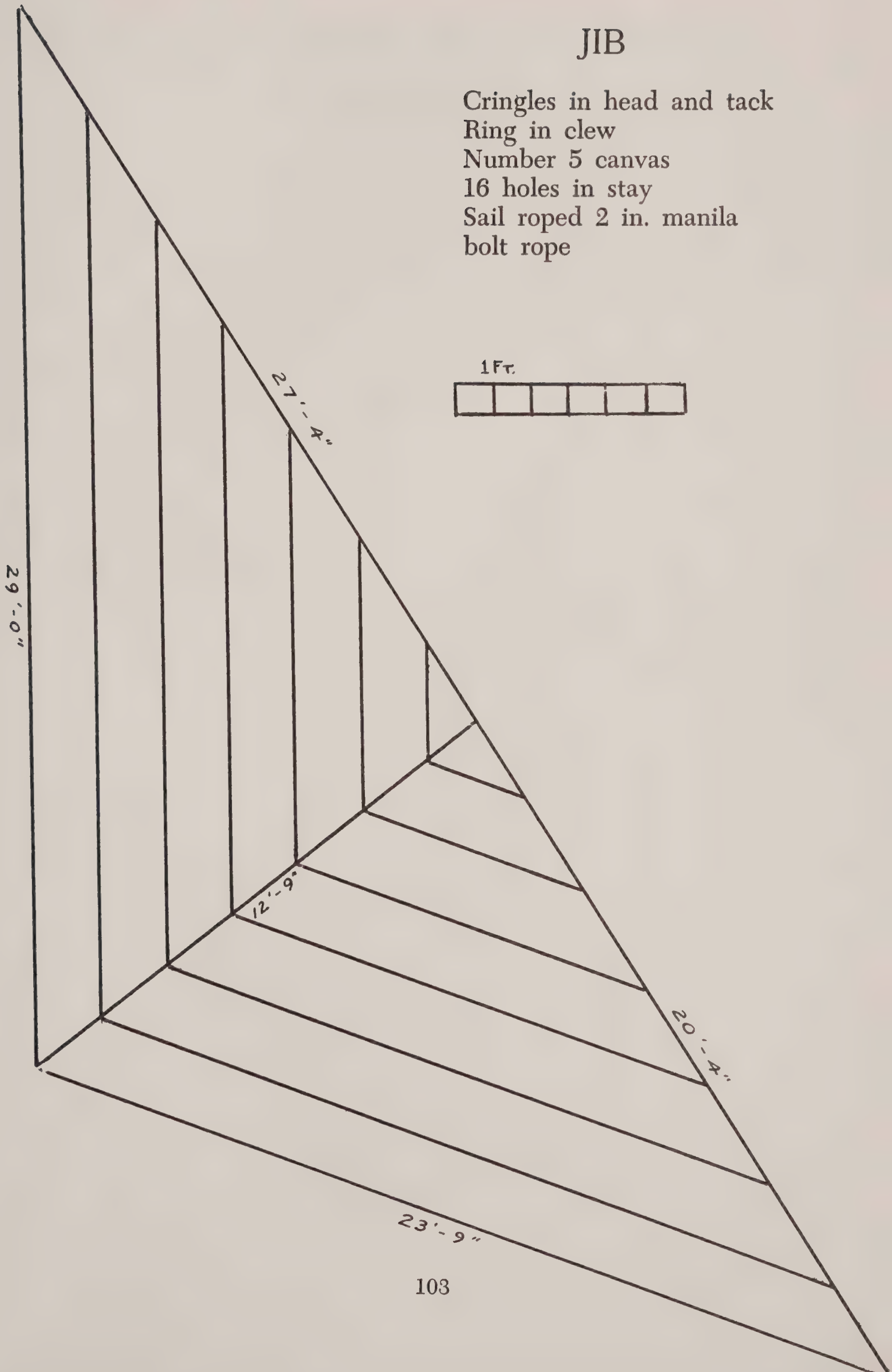
FLYING JIB

18 Holes in stay
Cringles in all corners
Number 5 canvas
Sail roped all around 2 in.
manila bolt rope



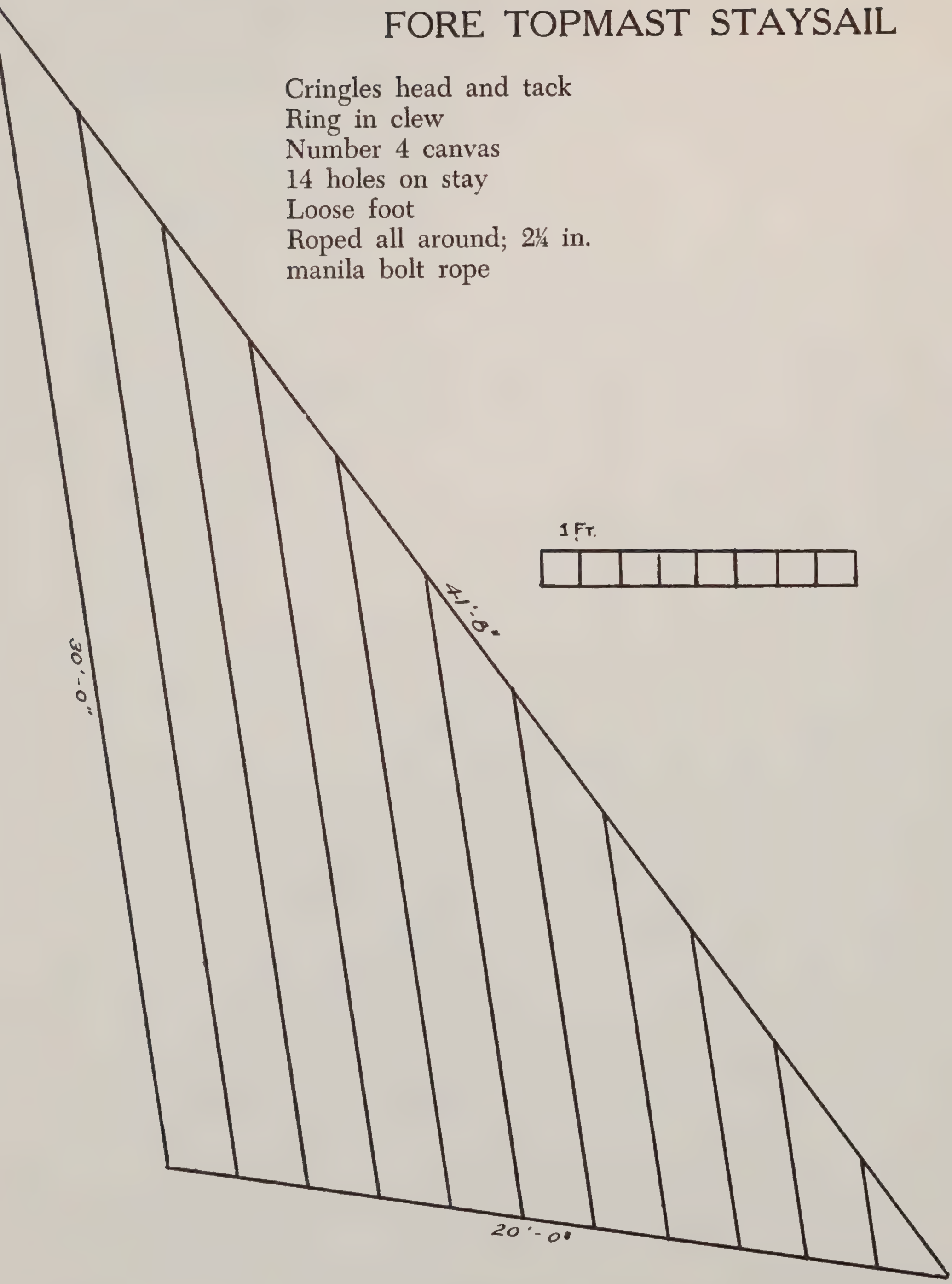
JIB

Cringles in head and tack
Ring in clew
Number 5 canvas
16 holes in stay
Sail roped 2 in. manila
bolt rope



FORE TOPMAST STAYSAIL

Cringles head and tack
Ring in clew
Number 4 canvas
14 holes on stay
Loose foot
Roped all around; 2¼ in.
manila bolt rope

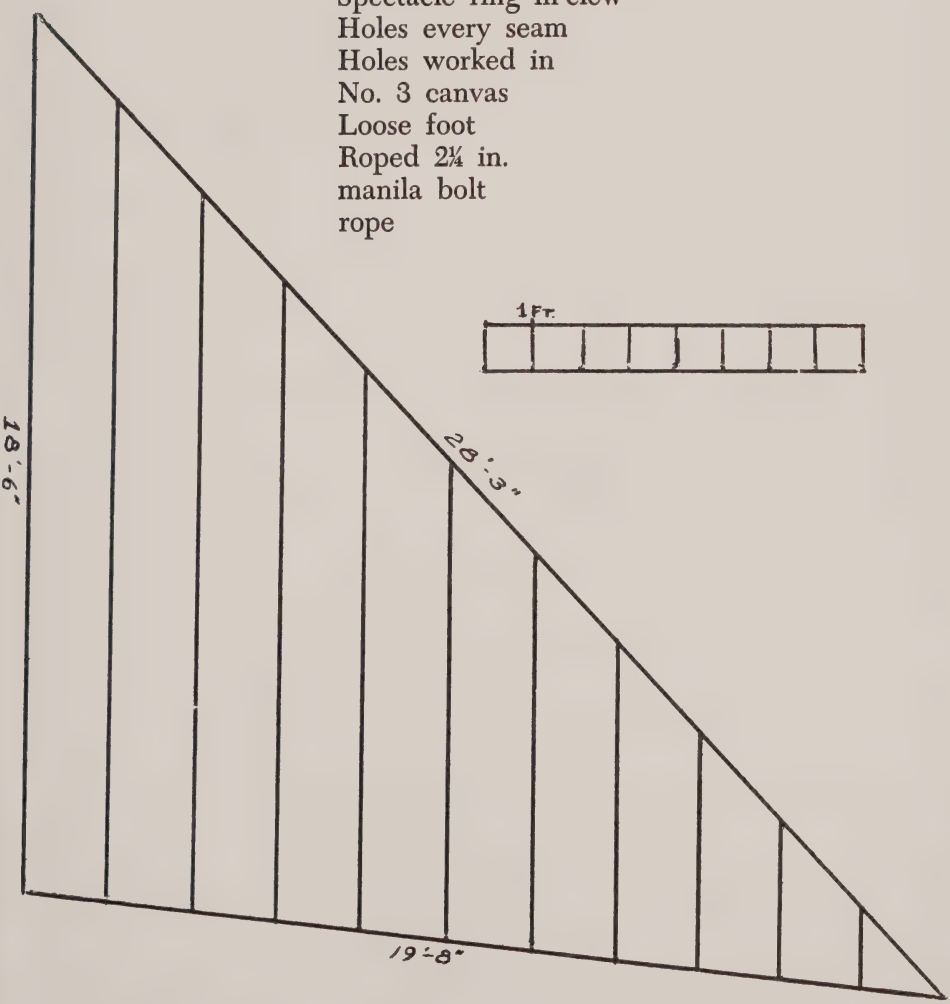


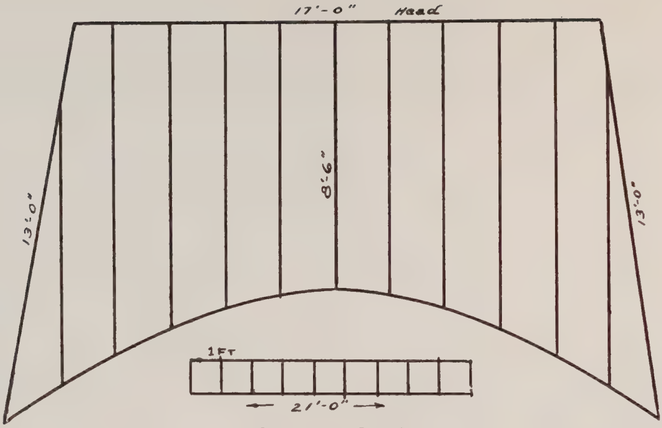
FORE STAYSAIL

NOTE

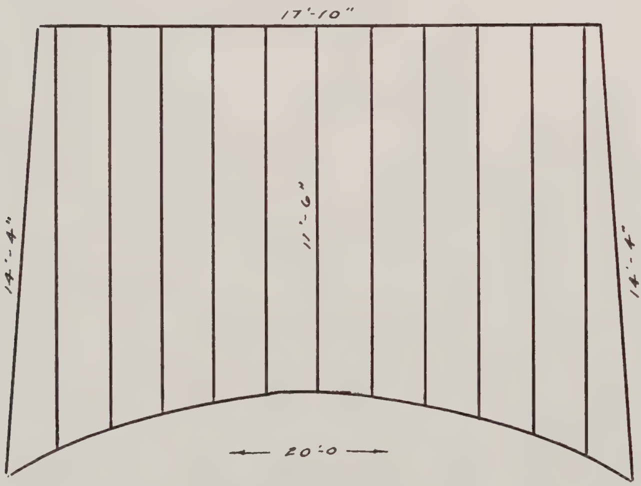
On a majority of the whalers the fore and main staysails were interchangeable.

Cringles head and tack
Spectacle ring in clew
Holes every seam
Holes worked in
No. 3 canvas
Loose foot
Roped 2¼ in.
manila bolt
rope

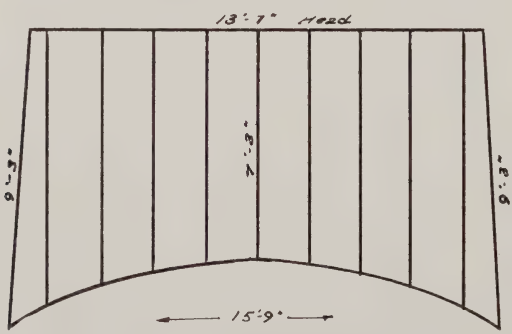




FORE ROYAL



MAIN ROYAL

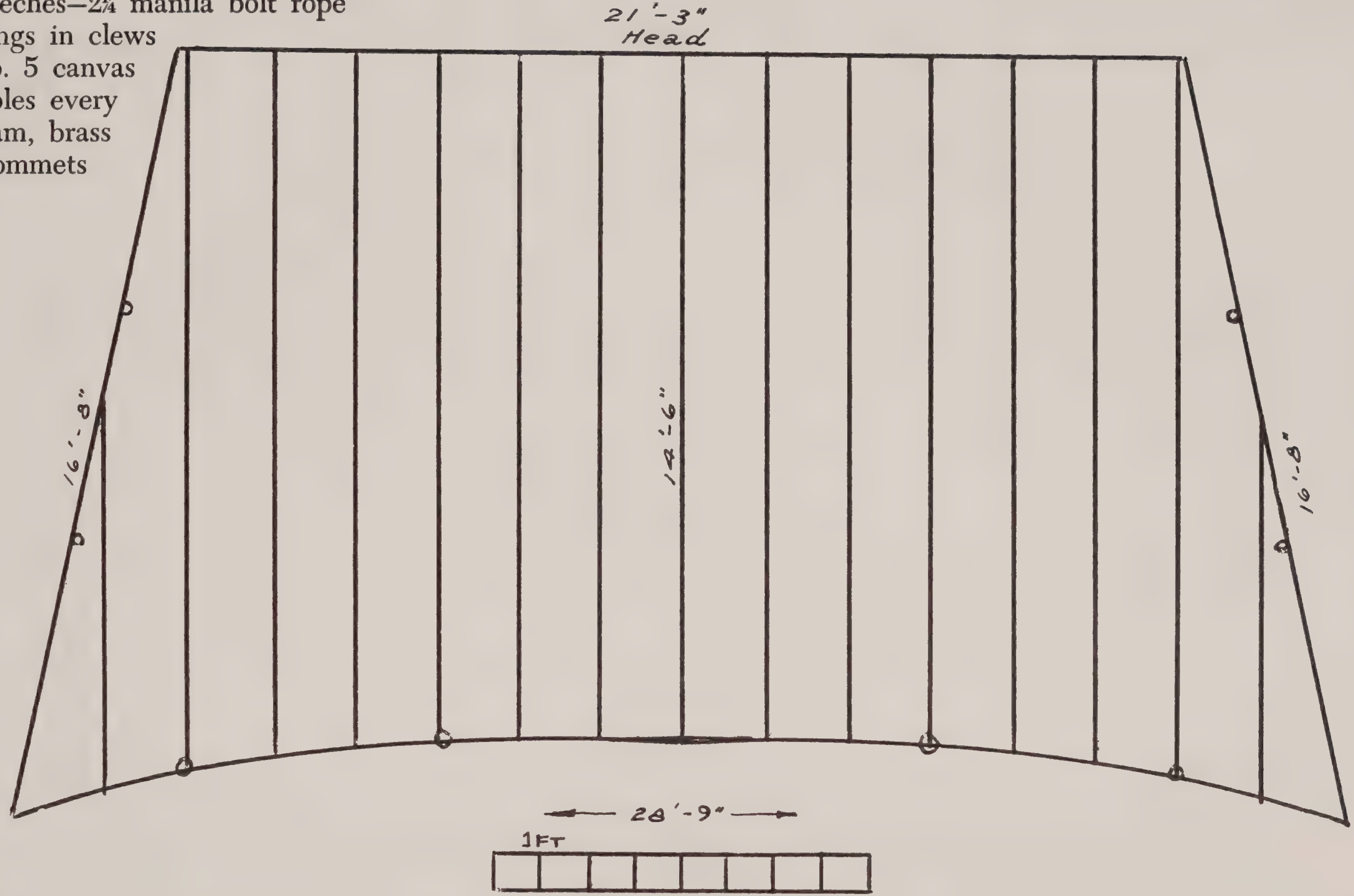


MIZZEN ROYAL

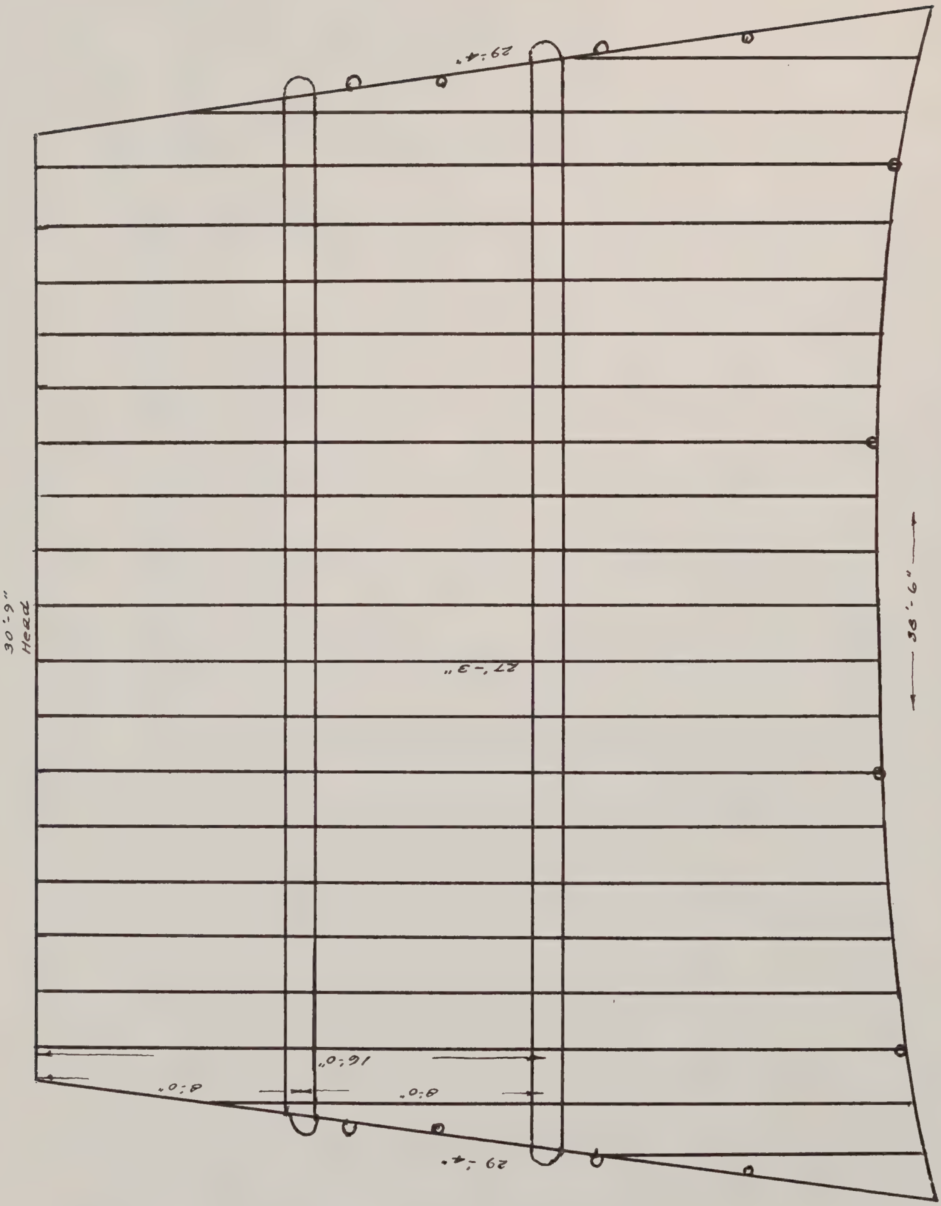
Two inch rope all around – Head and foot–hemp – Leeches –manila – Cringles all corners – Number 7 canvas – Holes every seam – brass grommets.

FORE TOPGALLANT SAIL

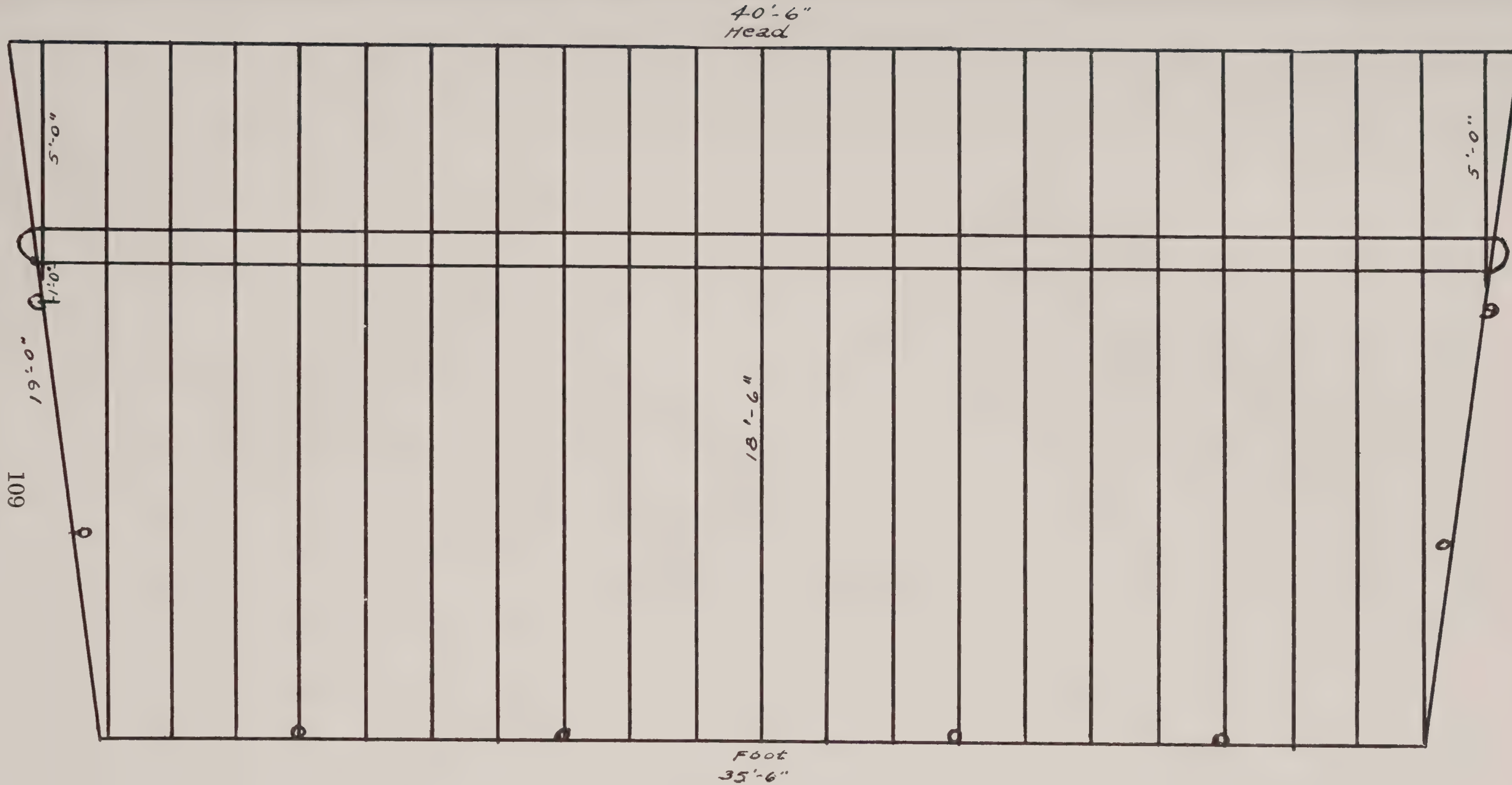
Head and foot–1¾″ hemp
Leeches–2¼ manila bolt rope
Rings in clews
No. 5 canvas
Holes every
seam, brass
grommets



FORE TOPSAIL



Rings in clews—holes every
seam in head—brass grommets—No. 4 canvas
Rope—head 1¾" hemp—foot 2¾" manila—leech 2½" manila

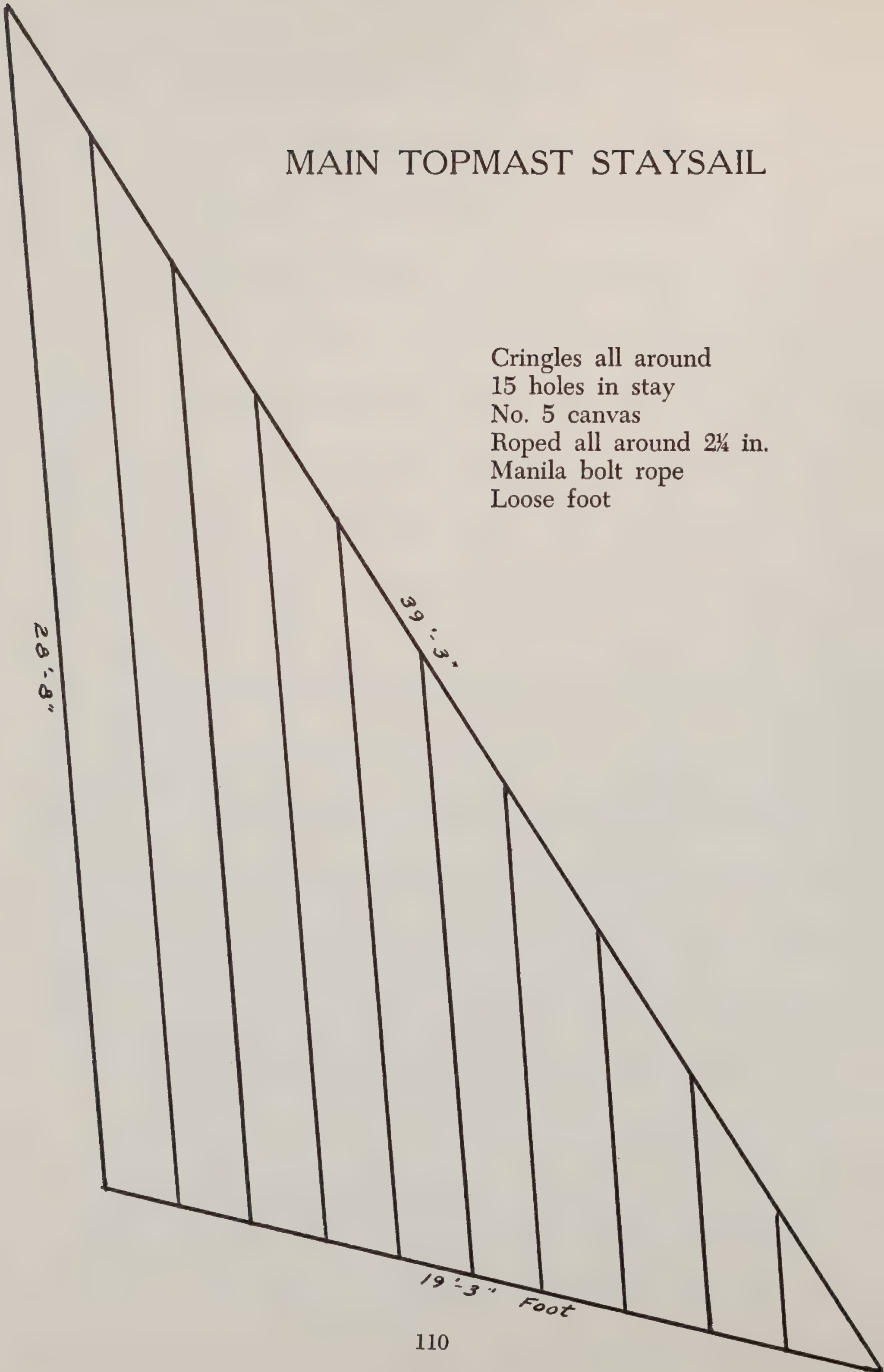


FORESAIL

Ropes 3 in. – manila bolt rope all around – Holes every seam in head – spectacle rings in clews – No. 2 canvas.

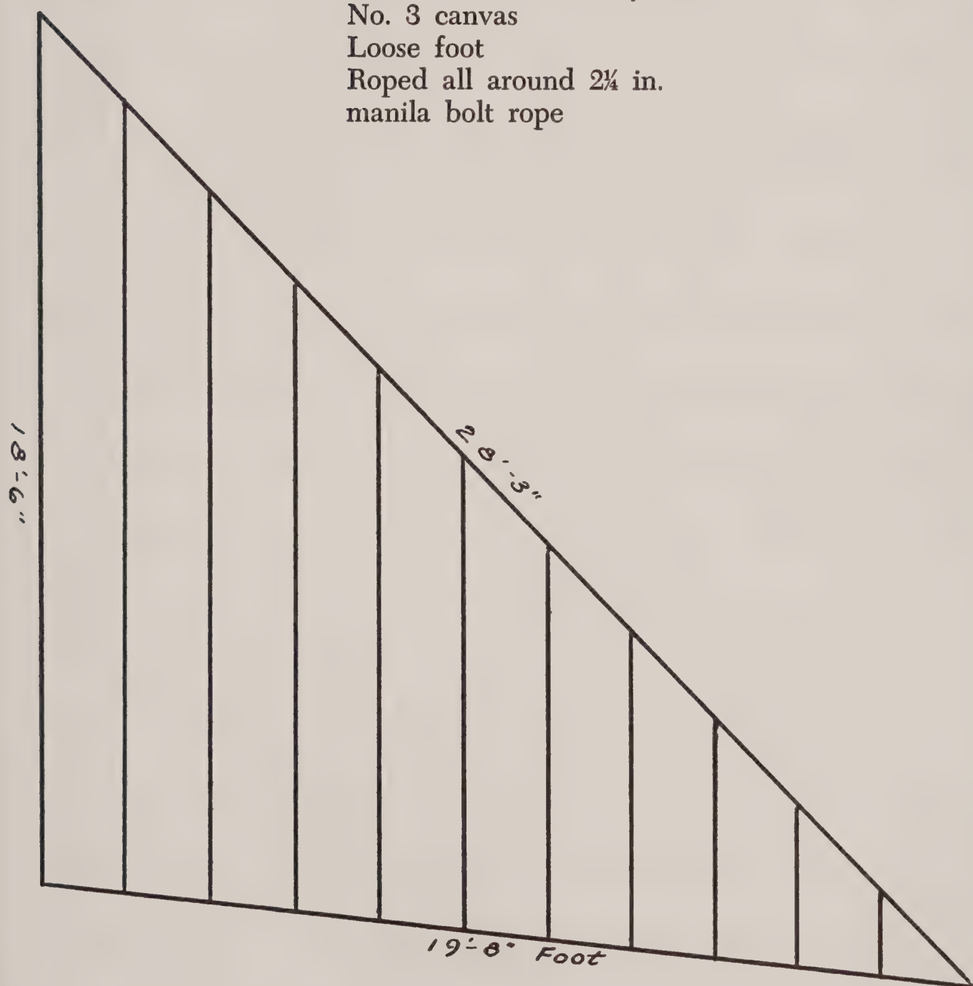
MAIN TOPMAST STAYSAIL

Cringles all around
15 holes in stay
No. 5 canvas
Roped all around 2¼ in.
Manila bolt rope
Loose foot

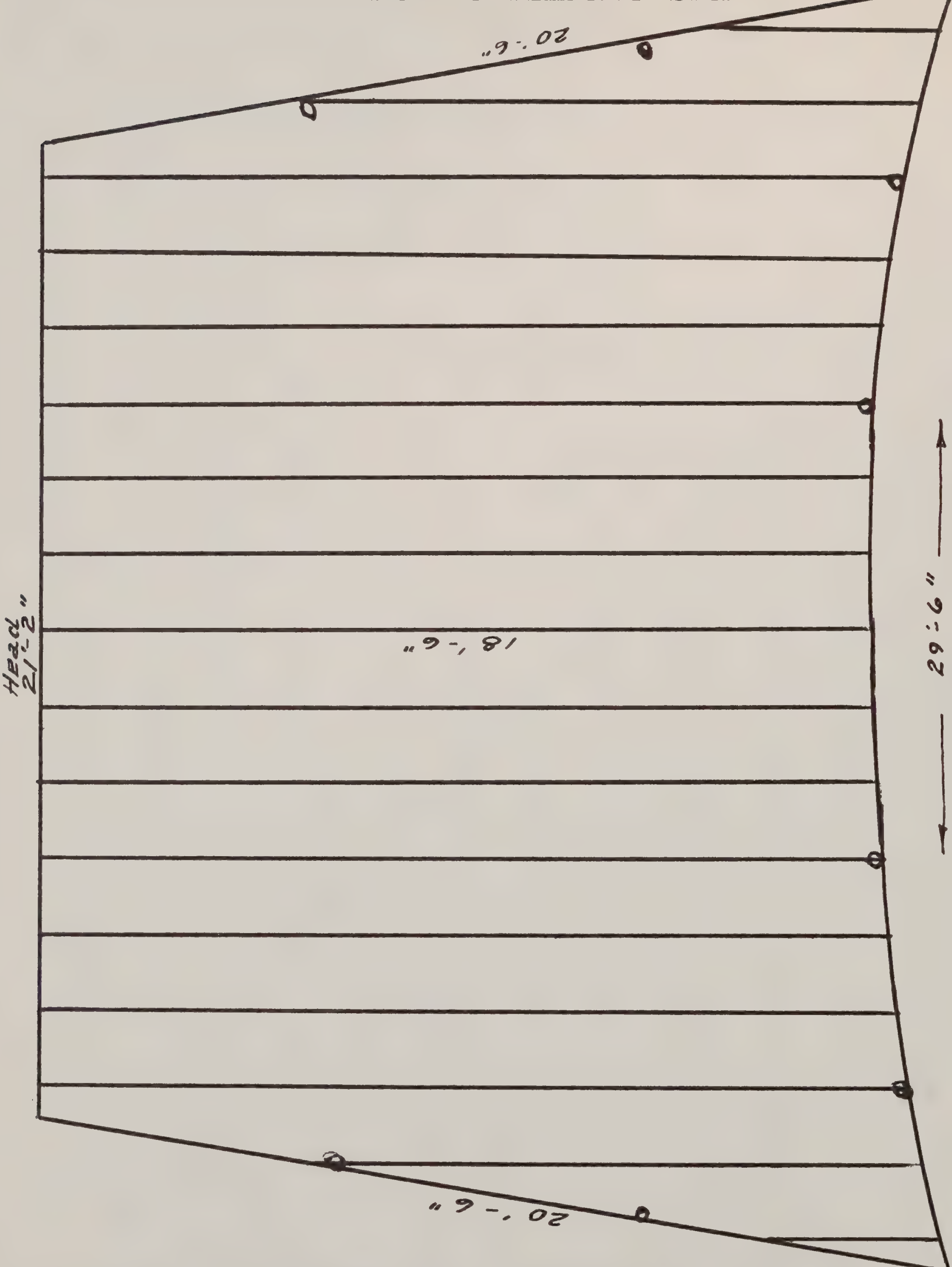


MAIN STAYSAIL

Cringles head and tack
Spectacle ring in clew
Holes worked in every seam
No. 3 canvas
Loose foot
Roped all around 2¼ in.
manila bolt rope

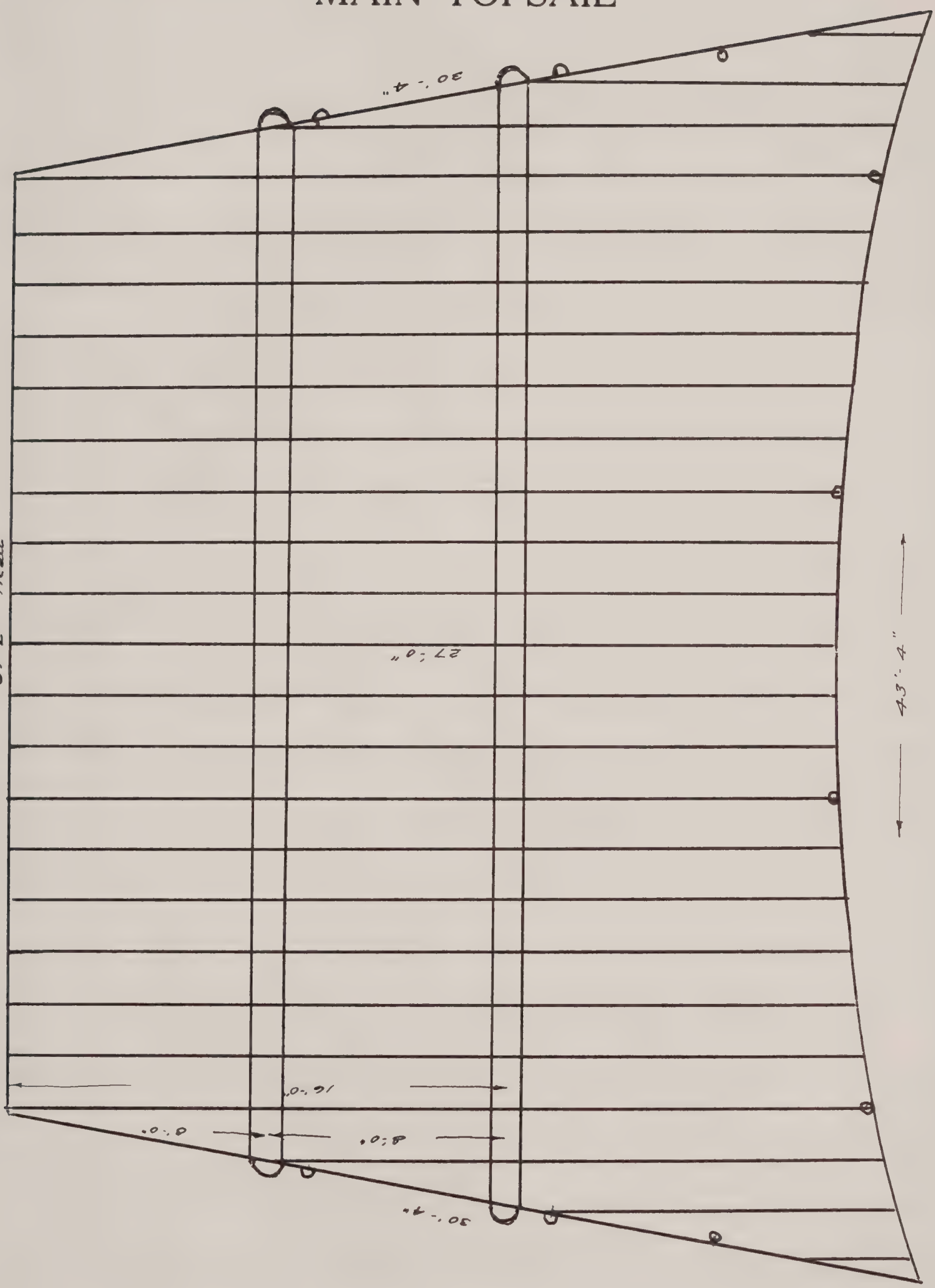


MAIN TOP GALLANT SAIL

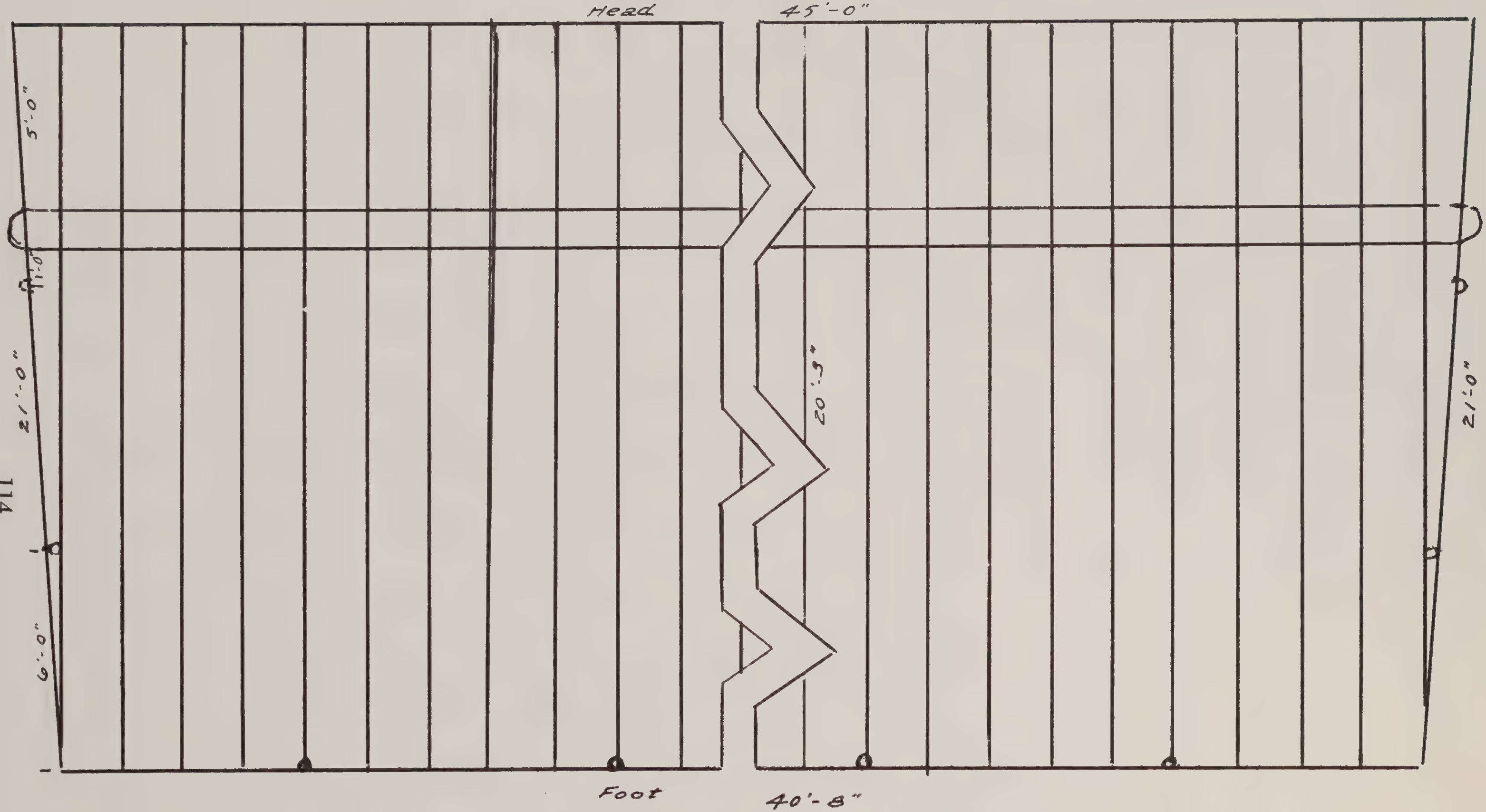


Head and foot–1¾ in. hemp – Leeches–2¼ in. manila bolt rope – Rings in clews (heart) – No. 5 canvas – Holes every seam – brass grommets.

MAIN TOPSAIL



Rings in clews – holes in every seam – brass grommets – No. 4 canvas – rope head 1¾ in. hemp – foot 2¾ in. manila – Leech 2½ in. manila.

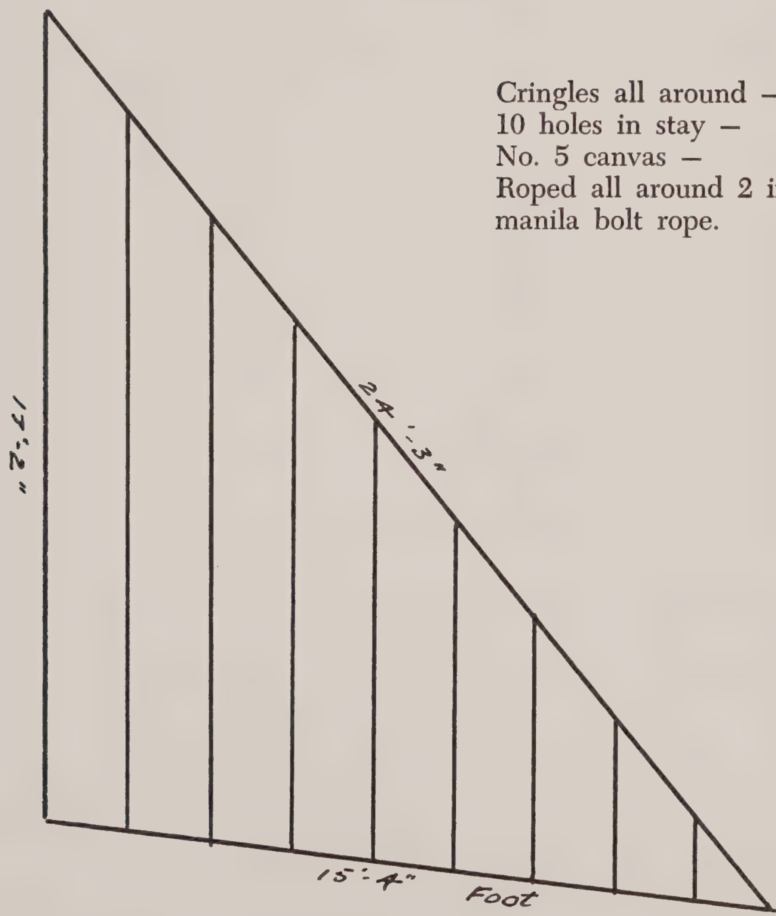


MAINSAIL

Roped 3 in. – manila bolt rope all around – Holes every seam in head – spectacle rings in clews – No. 2 canvas.

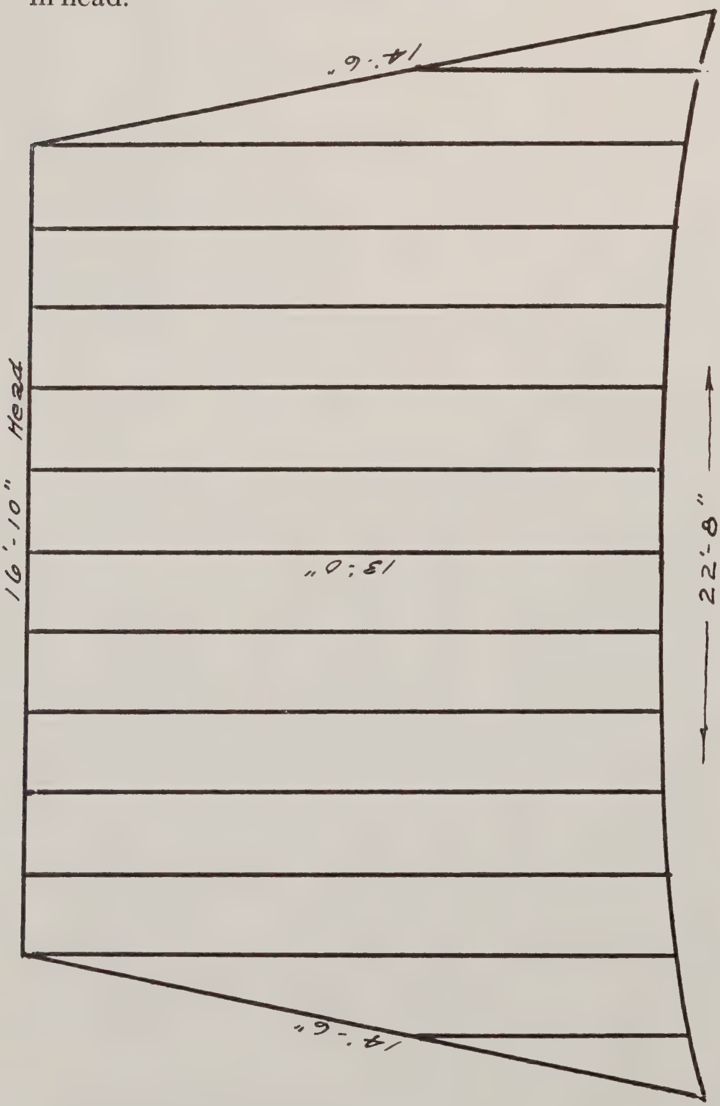
MIZZEN TOPMAST STAYSAIL

Cringles all around –
10 holes in stay –
No. 5 canvas –
Roped all around 2 in.
manila bolt rope.

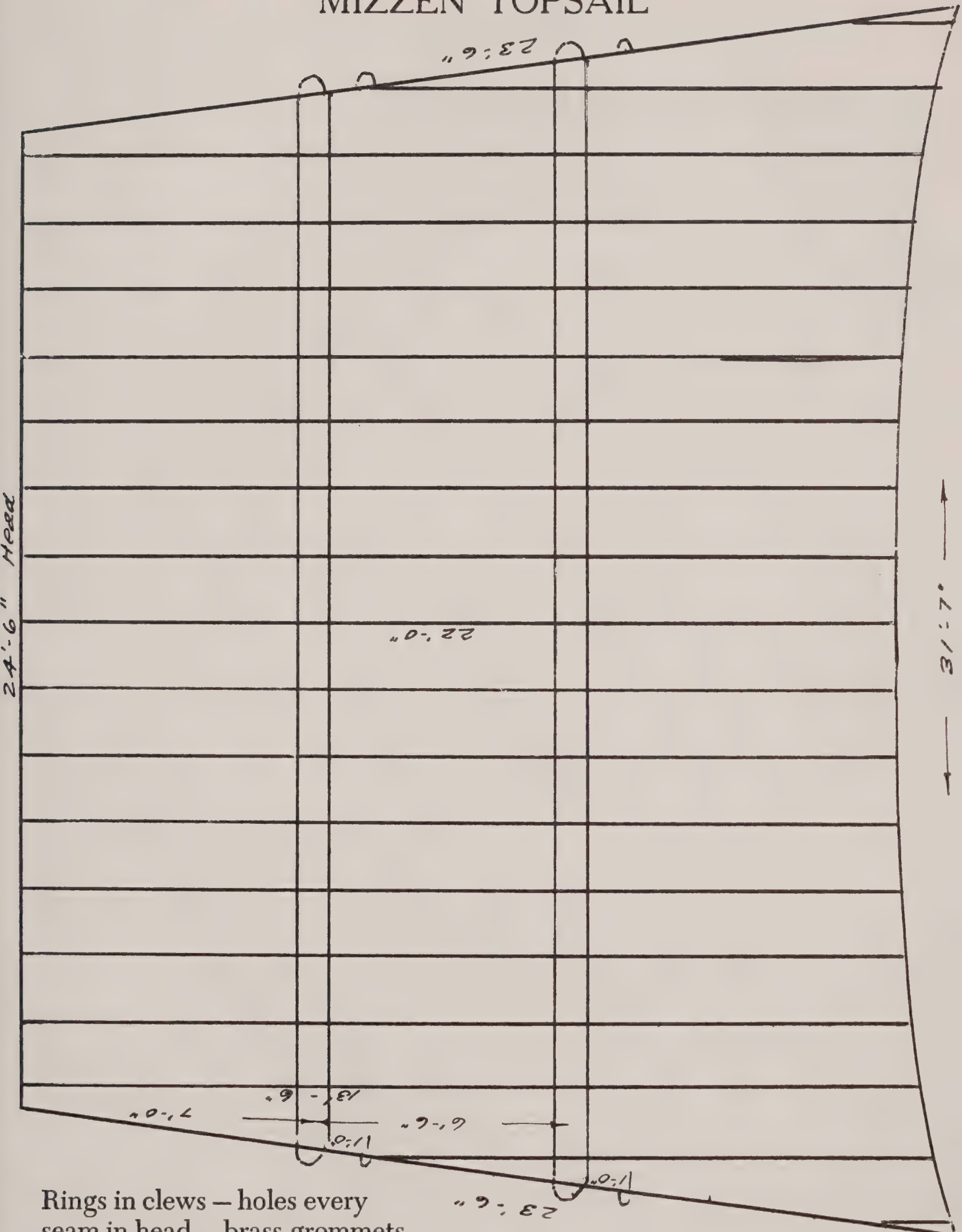


MIZZEN TOPGALLANT SAIL

Head and foot 1¾ in. hemp,
Leeches 2¼ in. manila bolt rope,
Rings in clews,
No. 5 canvas,
Holes every seam
in head.



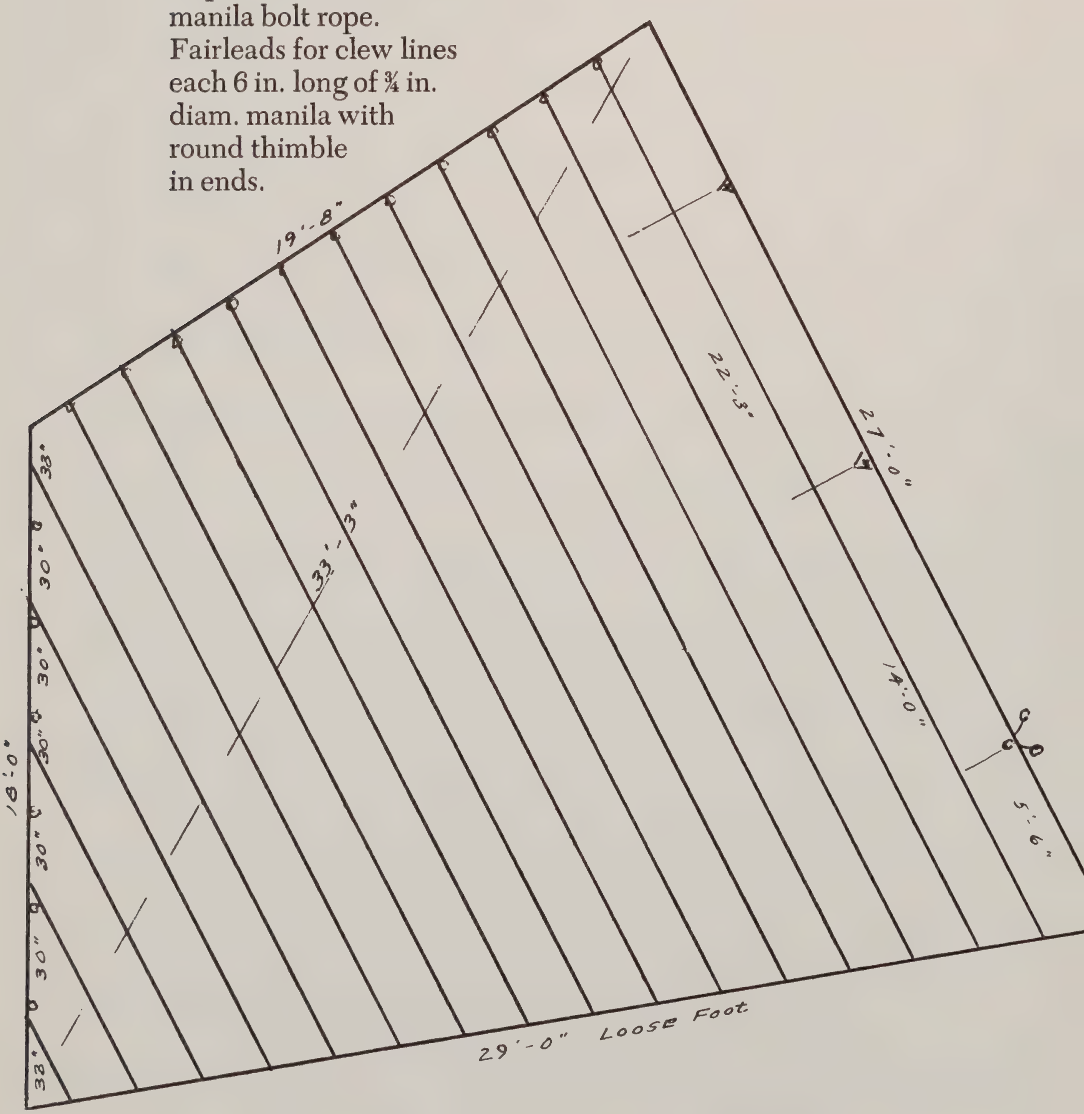
MIZZEN TOPSAIL



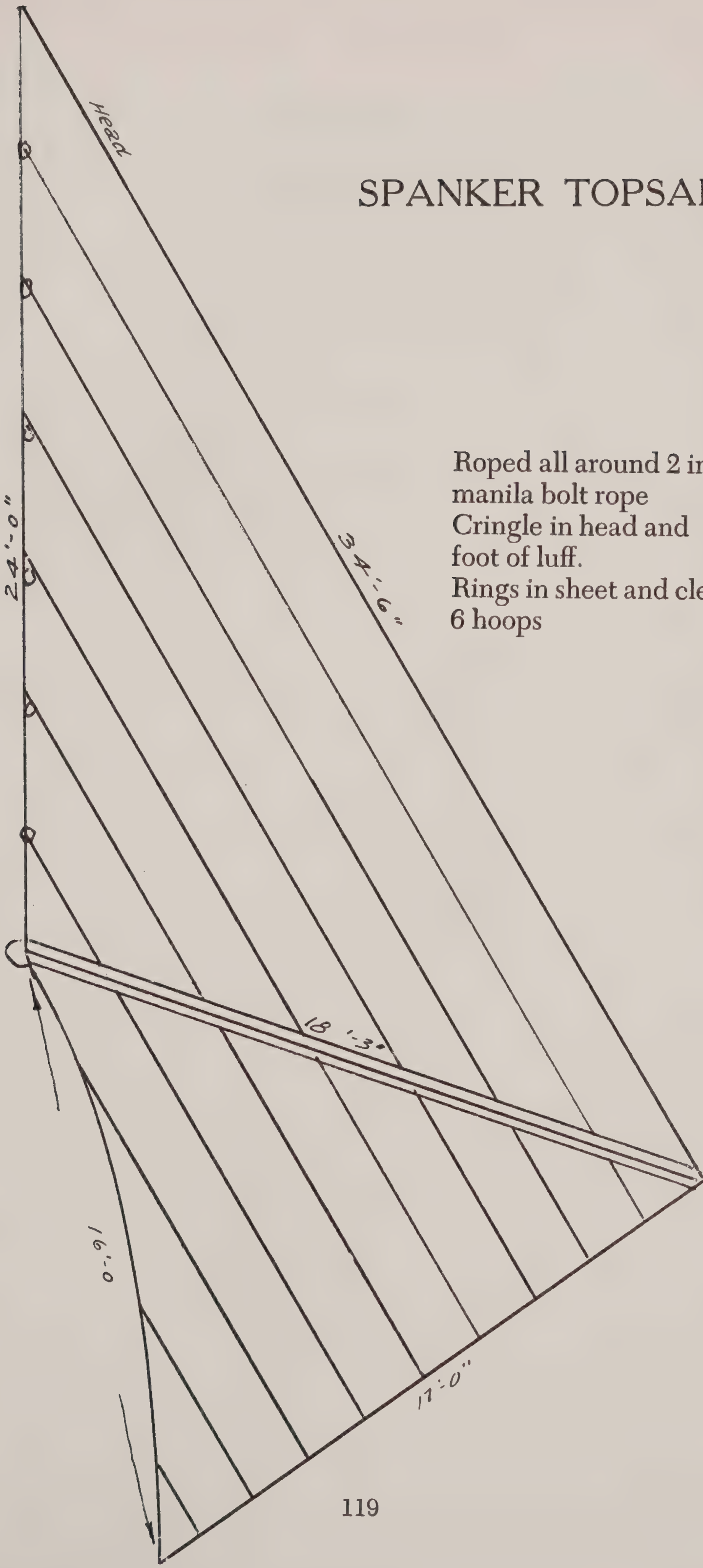
Rings in clews – holes every seam in head – brass grommets – No. 4 canvas – rope, head 1¾ in. head and foot – leeches 2¼ manila bolt rope

SPANKER

Ring in clew — cringles other corners — holes every seam in head
Loose foot — No. 4 canvas
Roped all around 2¼ in. manila bolt rope.
Fairleads for clew lines each 6 in. long of ¾ in. diam. manila with round thimble in ends.



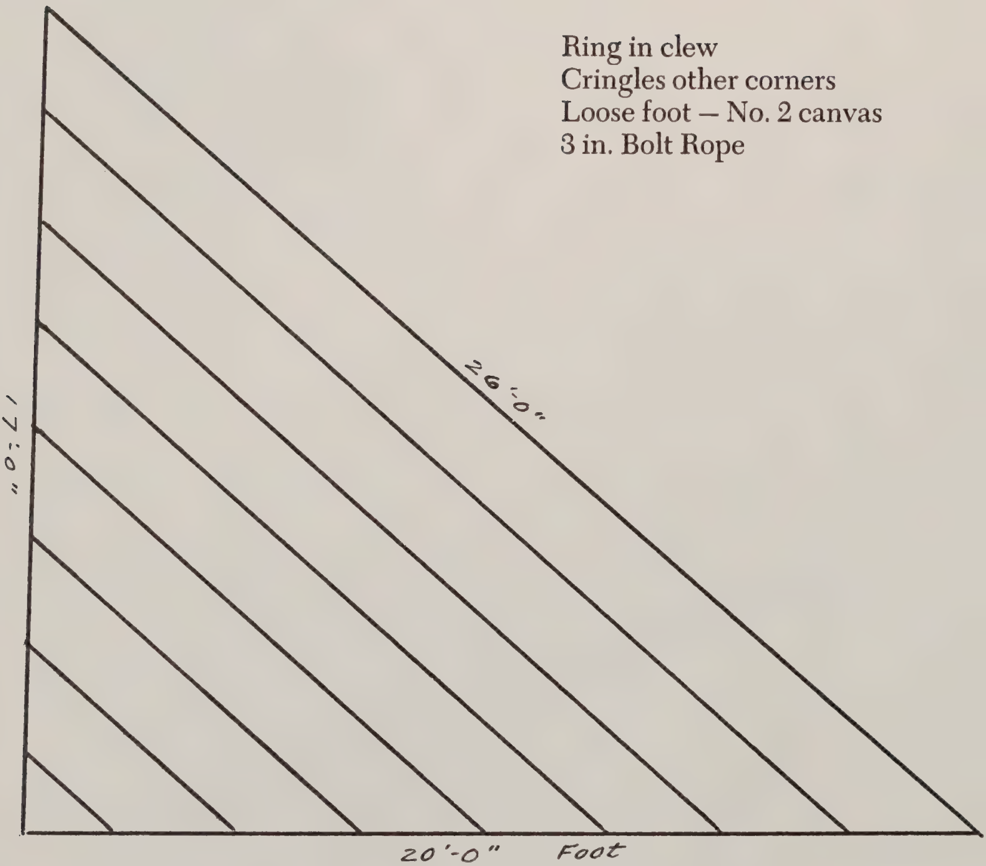
SPANKER TOPSAIL



Roped all around 2 in.
manila bolt rope
Cringle in head and
foot of luff.
Rings in sheet and clew
6 hoops

TRYSAIL

Ring in clew
Cringles other corners
Loose foot – No. 2 canvas
3 in. Bolt Rope



CUTTING FALLS AND CUTTING STAGE

CHAPTER XXII

THE "cutting in" gear, peculiar to whaleships, consisted mainly of two very heavy sets of blocks and falls, with the pulling end of the falls leading forward to the windlass. The upper blocks hung ten to twelve feet below the main top and each could be hauled forward, when in use, by a purchase from the foremast head.

Though a very simple rig, the cutting falls played an important part in whaling and might have been expected to have become pretty well "standardized." But this was not the case; some ships used double blocks at the upper end as did the SUNBEAM and JOSEPHINE but most captains preferred two single blocks at the upper end as was the case aboard the ALICE KNOWLES, WANDERER, SULLIVAN, JOHN R. MANTA and many others. The two block system was considered much better since one block could turn permitting a straight pull to the windlass.

Whichever method was used, single or double blocks, the manner in which they were fastened to the mast was usually the same. A long strap, made of twenty feet of two inch diameter hawser, parcelled, served and tarred, was doubled around a six inch iron eye and seized securely with ⅜ rope, there being three sets of seizing four inches wide, spaced six inches apart. The ends of the strap were passed through the top and around the head of the mainmast where the ends were laced together with ten to fifteen turns of "rattling stuff" (½ inch diameter tarred rope). There would be one of these straps for each set of falls. The block straps were shackled to those straps with heavy iron shackles.

The straps on double blocks were made of 1½ inch diameter hawser, parcelled, served and tarred; between the

block and a four inch iron eye at the end the strap was seized together by ¼ inch diameter rope. When the two single blocks were used they were rigged with a single long strap of 1½ inch diameter hawser, parcelled, served and tarred, about twenty feet long. A block would be set in each end of the strap and two sets of seizing made of ¼ rope, close together, was put on. The strap was doubled around a six inch iron eye with one block hanging down about a foot below the other. The doubled strap was seized together by three sets of seizing, four inches wide and spaced six inches apart working from the doubled end. As with the double blocks, these were shackled to the mast pendants with heavy iron shackles. Very few ships, except in the old days, had mast pendants and block straps in one piece. When not in use the falls were unrove and the blocks lashed to a six inch diameter spar that extended across the vessel from the port to starboard shrouds, just aft of the mainmast about fifteen feet or so above the deck.

CUTTING STAGE

To starboard, at the waist, was the cutting-in stage, it was on this stage that the men stood while cutting the blubber from the whales. The stage was a three sided affair, the outer side, which was parallel to the fore and aft line of the ship, was made up of two planks, 8 to 9 inches wide spaced about an inch apart, 20 feet long. Bolted to each end was a plank about 12 inches wide by about 10 feet long, that held the stage itself away from the ship's side. The after "leg" slanted forward at about a 60° angle while the forward "leg" slanted aft at about a 15° angle. The "legs" rested on the planksheer and were held by lanyards made of inch diameter rope and fastened to the pin rail or a convenient chain just below the deadeye.

Waist high, over the inner edge of the fore and aft planks, was a twenty foot pole, three inches in diameter, against which the men on the stage could lean to steady themselves while working. Holding the pole were three or four brackets, usually four, in the shape of inverted "V's", made of ¾ inch diameter iron rods. At the apex of the "V's"

were welded rings through which the pole passed. The two end brackets often had three legs, the extra leg acting as a brace to keep the pole from swaying fore and aft. The ends of the "legs" are spread 8 to 10 inches, with threaded ends that go through iron plates, the two end ones (with 3 legs) being ⅜ thick 10 wide and 15 inches long, the center plates being 6 by 15 and the same thickness. The threaded ends of the "legs" went through the plates and the planks and had a nut and washer on the end. The "legs" had either a nut or a welded shoulder above the plates. There was a backing plate, the same size as the upper plate on the under side of the staging. This construction enabled the men to take the stage apart for storage when the vessel was in her home port.

The stage was raised when not in use and held at the proper height when in use, by a block and tackle at each end. The after tackle went from about ten feet up the forward main stay to an eye bolt that went through the plates and both planks at the after corner of the stage. The forward tackle went from a post, similar to the boat lashing-posts, or bearers, to a similar eye bolt in the forward end of the stage. When in use the stage was lowered so it slanted slightly towards the ship. When not in use the stage was raised and went up as though hinged to the planksheer, the after end would be lashed to the main stay and the forward end to the post forward.

Heaving down the Bark SUNBEAM showing capstan and gear used.

Bark SUNBEAM hove down, being coated with "bright varnish" before laying pine sheathing and coppering.

THE SHIPYARDS

CHAPTER XXIII

TO those acquainted with modern shipyards, either through personal inspection or photographs, the places and facilities where whaleships were built seem very inadequate. By present day standards, whaleships were small in feet and inches and, being made of wood the various shapes of which were hewn to line chip by chip, no great expanse of area was needed. There were no great docks, vast buildings, heavy machinery, giant derricks, or travelling cranes. A half acre of ground with a gentle slope to the water was sufficient for the yard, it might be situated anywhere that timber could be carted, near some town or village where the workmen could live. A couple of eight inch spars, 35 or 40 feet long, were all the derricks needed; a semi-open shed, the buildings; a steam kettle and box, a nearby blacksmith forge and a small shop 30 by 40 feet, where inside joinery work could be fashioned, these were sufficient — these made up the shipyard.

As for repairs to vessels there never were enough railways to take care of the fleet, anything of a minor nature such as replacing a plank, the pine sheathing or recoppering was carried on by heaving the ship down alongside a wharf until the keel was out of water. Work was done from float stages, the ship being gradually righted as the work progressed upward. When one side was completed the ship would be turned around and the other side hove out and repaired. Sometimes a sandy beach would be used for the same purpose but it was rather difficult to do any but the work low down on the hull.

The heaving down gear, like everything else connected with whaling, was massive and of great strength. On the wharves where ships were most often hove down there were two 16 by 16 inch oak posts, about eight feet long,

spaced about three feet apart. About a foot or eighteen inches from each end was a 4 by 6 inch oak joist through mortised. One end of this set of posts was in the ground about six feet, this was the "anchor" for the heavy heaving down capstan. The heaving down blocks, usually five or six sheave blocks rove with 1¼ inch diameter falls, were fastened one to the "dead man," the posts holding the capstan, or a large slab of granite that was sunk into the ground, the other block would be hooked to a pendant coming from the mainmast head.

For major repairs, such as replacing a large number of planks, the shoe or stem, the ships were usually hauled out of the water on marine railways. These were huge cradles, that looked somewhat like a giant hay-rack, fitted by means of giant rollers to run in and out of the water on large parallel timbers, which extended at a slight grade from a hundred feet on shore out to a depth of water sufficient to float a ship into the cradle. When the ship was properly cradled and secured in place, the cradle with its ship was slowly hauled out by a heavy chain passing over a kind of sprocket that was turned by gearing connected to the capstan. The motive power was usually a horse although men were sometimes pressed into use.

Of the various yards, in and around New Bedford, by far the best remembered was that of the HILLMAN BROTHERS at the foot of Maxfield Street, less than a half mile from the center of the city. This was the largest of the local yards, having room to build several craft at the same time. It was there that the CHARLES W. MORGAN was built in 1841.

Before leaving the subject of shipyards it might be well to mention a very odd "yard" that launched four ships. Three whaleships, one after another, were constructed on a wharf near the foot of what is now North Street. To launch them, part of the stone wall at the end of the wharf was removed and a suitable trench dug down which the ships slid into the river. After the last was launched the wall was rebuilt. A fourth vessel, a three masted coasting schooner, was built on a nearby wharf.

THE BUILDERS

CHAPTER XXIV

THERE seems to have been something to ship building that bred a class of men who displayed an unusual amount of all around intelligence. Those old builders had scant, if any, scientific data to work from, neither were they well educated by modern standards – their knowledge was of a cumulative nature based on facts gleaned from experience. When a ship goes to sea there is no possible way to foretell the conditions she might have to meet, as a result, these men had to design and build so as to successfully compete with many unknown factors. Then, it was not, as it is today, largely a matter of mathematical computation, but rather a matter of judgment – a judgment that required deep thought.

Although each played a definite and vital part in the whaleship's success, the various trades which built her differed greatly in the mechanical skill and intelligence required and, strange as it may seem, skill and intelligence was not always a factor in determining the recompense each trade received.

First in importance were the ship carpenters or master builders – they were responsible for the strength and ability of the entire product, namely the ship. Since the shapes, sizes and materials were continually changing these men were continually in school – the school of experiment and experience. The master builder would not trust to enlarged plans alone, instead he had full sized patterns made, put in place, batterned and marked; taken down, cut to the line and put back in place. In this way he and all concerned could stand at a distance where they could see exactly how the size and shape of the pattern fitted in the hull.

Next come the shipsmiths who, with iron from Norway, hammered out the bolts, straps, trusses, bands, hooks, pins and shackles upon which the life of the ship depended. These, they fashioned remarkably well but, as their work was mostly repetition, it had but little educational requirement.

Next come the spar makers who, like the master builders, had to deal with unknown forces, their tasks required special study and intelligence.

Fourth, we have the riggers whose work, like that of the smiths, was largely a matter of repetition and did not require a very high order of mechanical ability.

The sail makers, like the spar makers, were building to cope with conditions they could not fully foresee and needed great skill and intelligence.

The boat builders, although both skillful and intelligent, needed little of either to build whaleboats since these became pretty much "standardized."

Next the coopers, who made the casks which held most everything the ships carried. Casks were all very much alike, building them required but little mechanical knowledge which was soon learned.

Sixth and last was the pump and block makers who, like the riggers, deal over and over and over again with the same materials in the same way.

When trade or mechanical intelligence is mentioned it should be realized that general intelligence and education, as it is ordinarily understood, is not meant; rather it is that special knowledge and intelligence that comes from long study of the problems of one's special trade or calling.

Sometimes, due to special conditions, this order of so-called importance might vary, but through the years this could be considered a reasonable listing of the importance of the various trades. Strange as it may seem, the financial returns to those carrying on the various trades bore little relation to their relative importance or necessary mechanical ability.

Of all the above trades, carried on in New Bedford, the coopers made the most money, the riggers came next,

then the shopsmiths, sailmakers, spar makers, pump and block makers, ship builders or carpenters and last the boat builders. There were, of course, exceptions to this general rating but this is just about the average order of their financial returns during the early 1870's.

Thus, incredible as it may seem, the ship builder, the man with the greatest responsibility, care, special intelligence and hardest work of the entire crowd, usually received next to the least amount of money. (It must be understood, of course, that when we mention ship builders or ship carpenters we mean those men who fabricate the hull rather than the yard owners). On the other hand, the cooper, who needed but little mechanical knowledge, headed the list in financial returns. The coopers actually had no part in building the ship, though their product was very vital to the success of whaling.

Although their work was very important, there is not much to write about in regard to the caulkers. Their work was extremely hard and monotonous, their wages were high but intermittent, they made a lot of noise with little to show for it. Caulking required both skill of hand and good judgment for on their work depended in large measure the safety of the ship.

The most distinctive badge of the ship carpenter was his rule, a single fold two foot rule, with arms usually ¾ an inch wide by 3/16ths thick. When it was closed it was a foot long by 1½ inches wide and was carried in a special pocket at the right hip. The thickness of this rule (3/16ths) was the proper gauge for seams to be caulked, which meant 90% of all the seams in a ship. One of the main characteristics, especially of the "bosses," was their perfect faith in "sight of eye." In those bygone days "sight of eye" was depended on to a much greater extent than today, hence the need of the old-timers faith and trust.

The precision with which a good workman could handle their broad-axes and adzes was uncanny. The cuts were either directly or diagonally across the face of the work (grain), with the ax-men using down strokes entirely, but the adzes were swung in most any way that was convenient.

Most of the adzes had a lip at each corner which cut the edges of the chips, thus preventing them from splitting in. The face was slightly rounded so the finished work was a succession of shallow, wave-like tiny ripples. As a general rule the axes and adzes were owned by the men themselves who scraped and fashioned the handles to their own feel and liking.

Of equal importance with the axes and adzes were the augers, which generally were owned by the shipyards. The double twist, round lipped, spur bit of those early days was used only for bungs and starting holes for the spurless augers. Practically all the boring was done with single twist, spurless augers with a square lipped cutter. Those augurs cut much faster than spur bits and bored much straighter holes, being without the spurs that often followed the grain of the wood. Most all the long augers had an eye at the top holding a wooden cross-bar. Those augers used for boring holes less than two feet deep and an inch and a quarter in diameter, had a shank bent into two cranks, one above the other, the lower offset eight to twelve inches, the upper four to six inches, so that when used both hands would swing in circles about a common center. It was a very awkward device for the novice, but those who had mastered the "hang" of the thing could bore at a surprisingly fast rate. This type of crank auger was used almost exclusively by ship carpenters and spar makers. When not in use the augers were carefully greased and hung on a wooden rack. The average ship-yard would often have a hundred of these augers, from ½ to 3 inches in diameter and 1 to 6 feet in length.

Regardless of the part a man played in the fabrication of the ship or his financial returns, each task was performed with the thought in mind that someday their life or that of someone near to them might depend on the quality of workmanship. Their meticulous attention to detail and their great mechanical ability resulted in ships that, on an average, had a longer life than any ships built before or after, be they made of wood or iron.

PART II

THE WHALEBOAT

THE WHALEBOAT

WHEN one first becomes acquainted, through hear-say or the printed word, with the wonderful qualities of the whaleboat, its grace and beauty of model, its unequalled safety at sea, combined with its ease of handling, he might be inclined to consider the "boat" the product of super boatbuilders.

Actually, the American whaleboat is the outgrowth of many trials to fit many and varied conditions. First of all, a whaleboat must be light enough to be handled quickly by four men at the oars, she must be able to go astern as easy as she will go ahead, she must be bulky, strong and buoyant enough to carry her crew and gear (nearly a ton in weight) safely in fairly rough water.

Her construction must be such that she can be easily repaired at sea without costly or complicated tools. Yet, while incorporating all these qualities in the final product, the cost factor must be taken into consideration. She must be cheap to build since most boats were only expected to last a single voyage of three or four years and, of course, many were smashed in service.

Although, for their size and usefulness, whaleboats were the lightest, weakest and cheapest to build, they never the less were the most efficient boats ever built. They were well suited for their work or there would have been many radical changes through the years. These boats seemed to have attained their degree of perfection very early in the history of New England whaling since they remained practically the same for generations. While they were perfect for whaling, they were almost useless for anything else — too large for row boats and, although fitted with center boards, which came into general use about 1850, they were very poor sailers close hauled.

One must remember that the whaleboat, like the whaleship, was constructed for a specific purpose and, through the ingenuity and "know how" of those old time "Yankee" craftsmen, both of them reached perfection at a very early stage in their careers.

Of all existing craft, whaleboats seem to be the nearest relative to their ancestors, the Viking ships. Excepting for the very high ends of the latter, whaleboats and Viking ships are shaped remarkably alike; also, it might be said, the earlier whaleboats were "clincher" (called clinker by the whalemen) built as were all Viking craft of which there are any relics.

The average whaleboat of the early 1800's was about 28 feet long, 6 to 6 feet 2 inches wide, 2 feet 2 inches deep at the center with the ends 34 to 37 inches high. They were full bodied amidships, the angle of dead rise being 8 to 10° with a "quick" turn at the bilge. The bottom of the keel was straight, both bow and stern, which were very much alike, had considerable over-hang, generally about 4 to 4½ feet. The two ends viewed from the side were shaped almost exactly the same but forward she was fuller than aft when viewed from below.

Without doubt the very early boats were of the "lapstrake" type of construction, which was almost universal for small vessels in those days, it being the easiest and cheapest construction. Very early the drawbacks of the "clincher" built boats was discovered, they were noisy, hence a change was necessary. It was not long before the "batten" method was generally adopted even though it did add considerably to the cost of building by doubling the number of planking nails and by having more difficult seams to fit as well as increasing the amount of planking.

THE BOATSHOP

TO better understand the steps in the construction of a whaleboat it might be well to take an imaginary journey back to the middle 1870's, and visit a boatbuilder's shop, thus obtaining a much clearer idea as to how whaleboats were built.

The shop is quite apt to be a plain wooden building, about 30 feet wide by 45 feet long, with an ordinary door at a front corner and wide double doors centered in the front end of the building. Along each side there would be a row of windows with a shed, or two or three windows at the rear of the shop. There are no posts, if by chance there is a second floor it will be supported by large cross beams or "hung" from the roof.

On each side, beginning 10 to 12 feet from the front and running to within 8 or 10 feet of the rear wall, is a plank bench about 2½ feet wide and 2 feet 8 inches high with the fronts, which are supported by posts about 6 feet apart, open except for an occasional drawer. The back of the bench rests on a joist nailed to the studs.

In the rear corner is the steam kettle and box. The kettle, a cast-iron pot of about 15 gallons capacity, is set in a brick, ovenlike affair that has plenty of space for a fire underneath. There is a cast-iron fire door hinged to a door-frame of the same metal set into the brickwork, sometimes it would be a sheet-iron door that would slide either way on an iron rod. The kettle cover is made of two layers of inch thick, wooden boards, crossing each other and clinch nailed. In the cover is a two or three inch square hole for steam and a round hole, with a wooden plug, for water.

The steam-box, made of 1½ inch thick planks, is about 10 by 14 inches in cross section and 8 to 12 feet long. It is

Leonard's Boatshop – original painting at the Old Dartmouth Historical Society.
Boatshop with one keel plate in use.

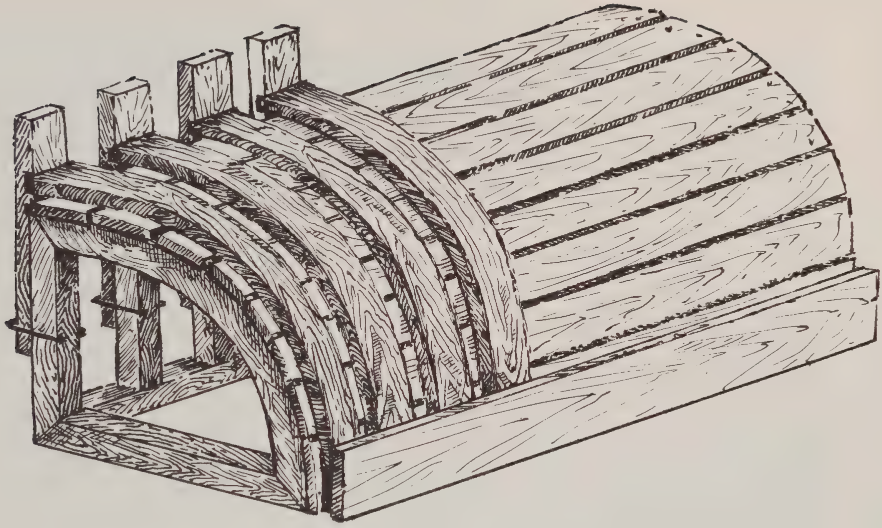
supported on brackets fastened to the side of the building so as to be over the kettle, to which it is connected by a square wooden pipe. The end covers of the "box" are made in a similar manner as the kettle cover and are so fitted as to wedge tight behind removable cross bars. The bottom of the "box" itself is about six feet above the floor.

Near the steam box is the timber (rib) bending "trap," the form over which the whaleboat timbers are bent to shape. This "trap" is about five feet long with a cross section like the cross section of half the central part of a whaleboat. The curve is of slightly less radius, about two inches less, since the timbers tend to straighten somewhat after being taken from the "trap." The surface is made of narrow boards planed true and fitted with oak ribs, about ½ inch thick by ¾ wide, accurately spaced and fastened ⅞ of an inch apart, forming guides between which the timbers are bent.

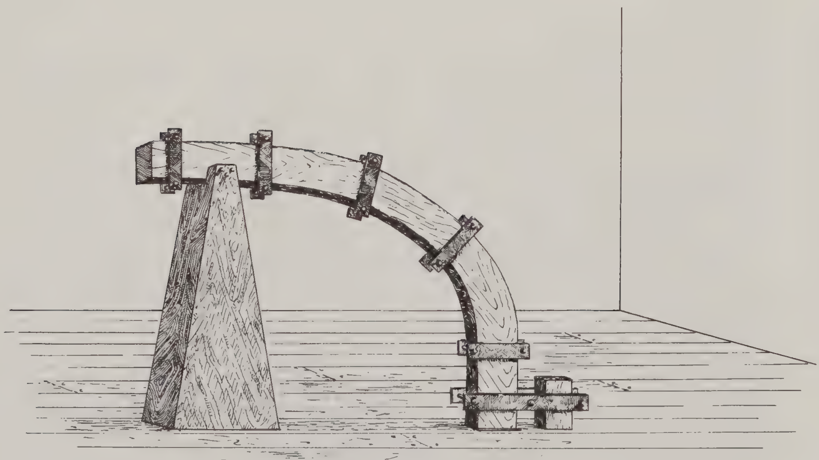
Beside the timber "trap" is the form for bending the bow and stern "stems," this form is simply a curved log 6 or 8 inches square, worked out of a natural crook or an old wooden davit. Both the "trap" and "form" have one end of the curve near the floor and each are fitted with a bar back of which the lower ends of the timbers or stems are caught. The curves which begin upright at the floor end about level and are fitted with hooks to hold the bent sticks down in place. The timbers, ¾ by 1¼ inches are sawed out of the toughest white oak and, after being steamed about an hour, are bent edgewise, the ribs or guides on the "trap" preventing them from bending or twisting sidewise.

The stems, like the timbers, are of the best white oak, 1¾ thick by 3 inches wide; they are also bent sidewise and being so large, they require a great deal of power to bend. Since there is quite a tendency for the stems to break, while bending, a strip of hoop iron is fastened over the outside edge, this grips with tremendous force as the stem is bending. The stem is clamped to the form, which is also slightly less than the required radius, every 15 to 18 inches.

It should be borne in mind that the word "timber," as applied to the frame of a boat or ship, means what is gen-



Timber (rib) trap.



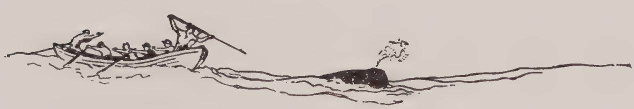
Stem and sternpost trap.

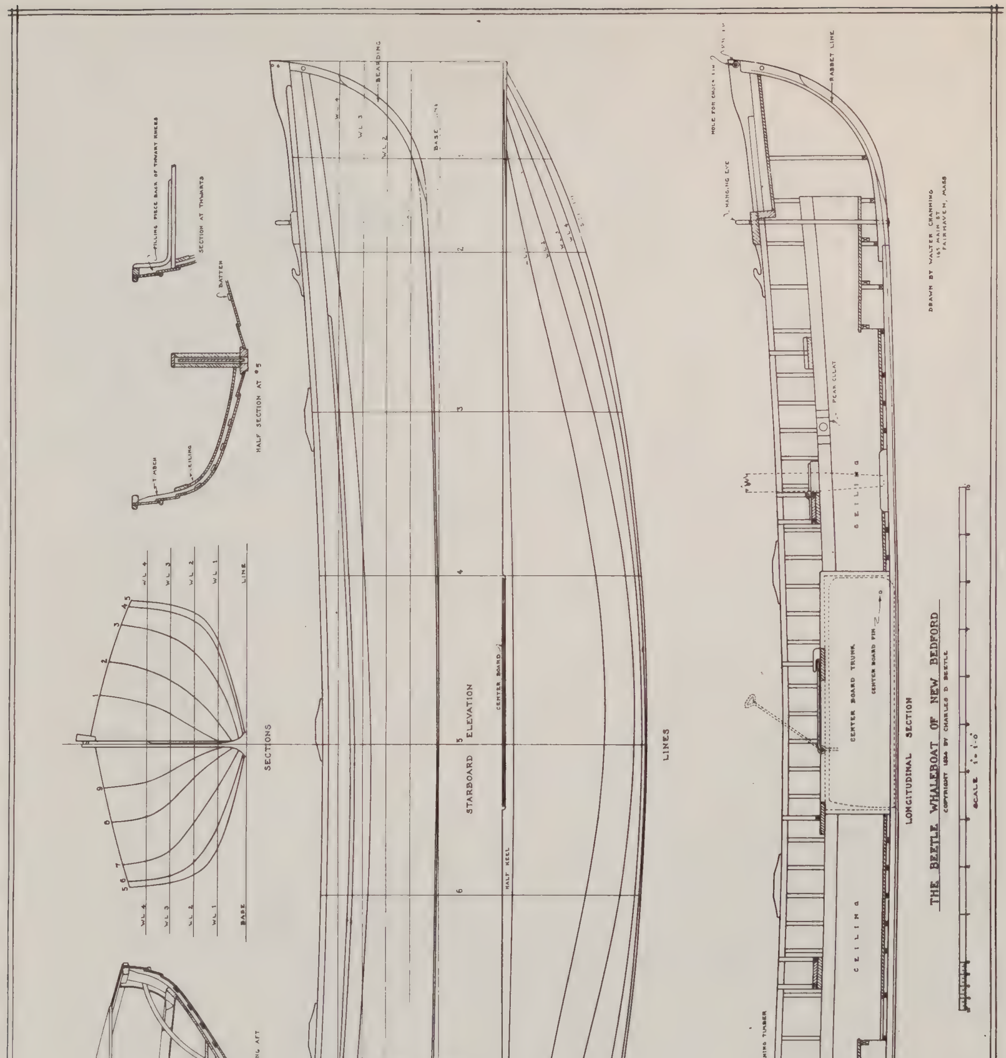
BENDING TRAPS

erally called a "rib." Size has nothing to do with it, be it a half inch square timber of a row boat or a foot square one of a ship, they are both "timbers."

On the shop floor, about 9 feet apart and set lengthwise of the room, are two 2 by 10 inch planks, usually white pine, about 18 feet long. These are set on edge and propped up about 16 inches high, with rigid bracing from the floor to prevent any sideways movement. These are the keel plates on which the keels are fastened while the boats are under construction; a narrow shop would have but one keel plate, but a good many, like our imaginary shop, have two.

Under the benches are bundles of unbent timbers, loggerheads, chocks and cheek pieces along with many other small parts made ready during any spare time. On racks, hanging overhead and on brackets projecting from the walls, are spare keels and gunwales, cedar boards for planks and ceiling, pine boards for thwarts, oak boards for rudders and center boards, strake patterns and cross section moulds. In one corner, with their lower ends caught against a joist nailed to the floor and their upper ends under a strip nailed to the studding, are a lot of bent timbers so placed that they can not straighten, also some stems with board ties to make them keep in shape, over all is the tantalizing smell of cedar and new wood.





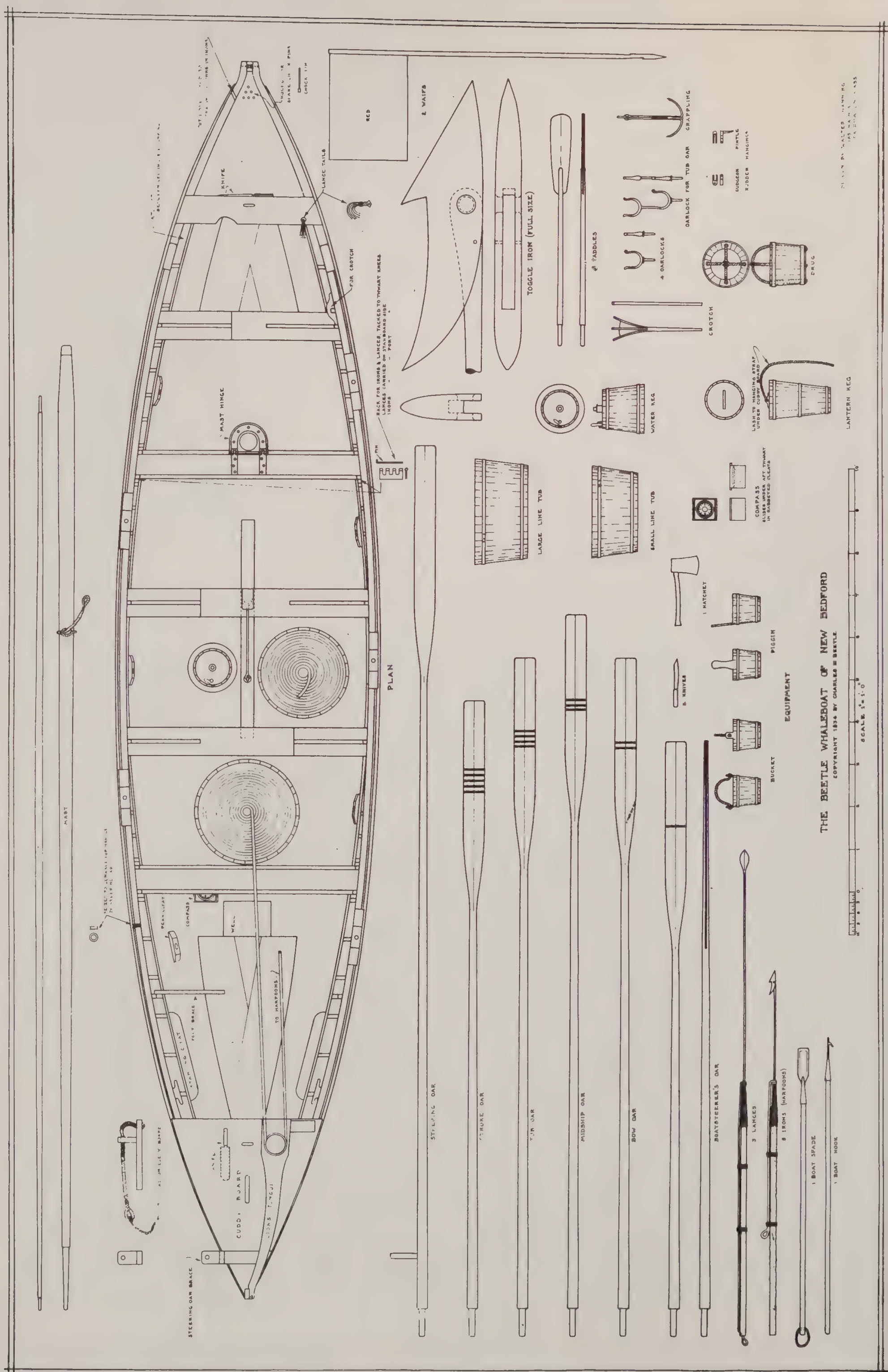
Whaleboat hull plan

BUILDING THE BOAT

WHALEBOATS, which were a highly specialized craft, very early in their history became fully developed and had their construction pretty well "standardized" by the builders. We would not go far afield were we to consider the whaleboat as perhaps the earliest example of the American idea of mass production. This statement might appear a bit far fetched but when we consider how the boats were built this idea is well within the bounds of reason.

Each boat builder had a set of forms around which his boats were built. These forms, five in the early days and seven in later years, were patterns of the inside cross sections of the boat at different points or "stations," they correspond in a manner of speaking to the full size patterns when building a ship. Instead of being just a pattern, the planking of the boat was bent or moulded to shape around these forms. Thus to all intents and purposes each boat should be an exact duplicate of the others made on the same moulds. As far as appearance to the observer was concerned this is true but as for handling qualities no two boats were the same.

The keel of selected oak, 1¾ thick and about 7½ inches wide at the center, tapered by easy curves to about 3¼ inches at the ends and is usually about eight feet shorter than the extreme length of the boat. It is sawed to pattern and the edge rabbeted, leaving a "lip" ½ inch thick and projecting ¾ of an inch. Since these "lips" formed a bearing for the planks next to the keel (the garboards) the bevels of the underside had to change as it went from end to end. To make this bevel the keel was placed upside down on the bench and at regular intervals (about three feet apart) were cut patterns of the proper bevels for a couple of inches, this was called "spotting," then the lips were planed to fit the spots.



Whaleboat gear.

The rabbets in the stems were cut with chisels and flat gouges, leaving two inches outside the rabbet line from which point the stems are beveled, leaving their outer edges about ⅞ of an inch thick. This beveling, or more correctly tapering, stops about six inches below the top of the rabbet, the stems being full size above this point. The lower ends, called "heels," of the stems are notched and scarfed on the keel, lapping it about ten inches and are securely riveted in place. The joining of the rabbets of stems and keels are faired in together.

The centerboard box, called the "well," was usually six feet long and seventeen inches high with a 1⅛ by 2½ inch oak post at each end passing through the keel at the ends of a slot and fastened by a quarter inch bolt through the keel. The sides are inch thick white pine boards nailed on each side of the posts and resting on top of the keel, to which it is fastened by ¼ inch bolts driven up through the keel. The well seams are caulked with strands of lamp wick to make them tight.

The centerboard is of ⅞ inch thick oak and is cleated at each end. The forward end is square and the after end is slanted forward so the upper corner will clear when the board is let down. It is hung on a brass bolt passing through the well and board about four inches up and back of the lower front corner. It is pulled up and pushed down by an iron rod connected to the board near the after end by two eyes, the upper end is bent into a flattened eye for a hand hold. When the board is up the eye in its top comes slightly above the well cover through a hole just large enough to let it through, the rod is then laid along the well top and the large eye slid under a cleat thus firmly locking the board. The rod is usually 5/16ths in diameter and about 18 inches between the eyes.

When the stems are riveted on and the rabbets trimmed, the keel is ready to set; at this time the centerboard well may be installed or it can be set later, just as the builder may decide. Either way, the keel is set on the keel plate and shored down from an overhead plank similar to the

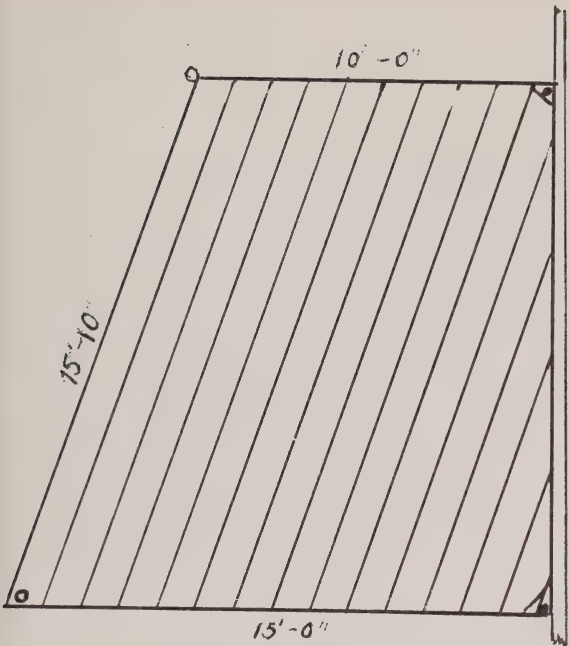
keel plate. These shores are really posts of two by three inch spruce or pine and are set plumb at the proper places for the moulds.

After the keel has been centered on the keel plate, shored down and braced straight sidewise the stems were braced and fastened plumb. Next the forms are placed against the shores, carefully centered, plumbed and fastened with screws; it is then squared crosswise and braced. The planking comes next.

In a general way the outside covering on the sides and bottom of any size wooden vessel is called "planking" without any reference to thickness; also one continuous line of plank from bow to stern is called a strake — it may be several pieces butted end to end in a long vessel or in one piece in a row boat, in either case it is called a strake.

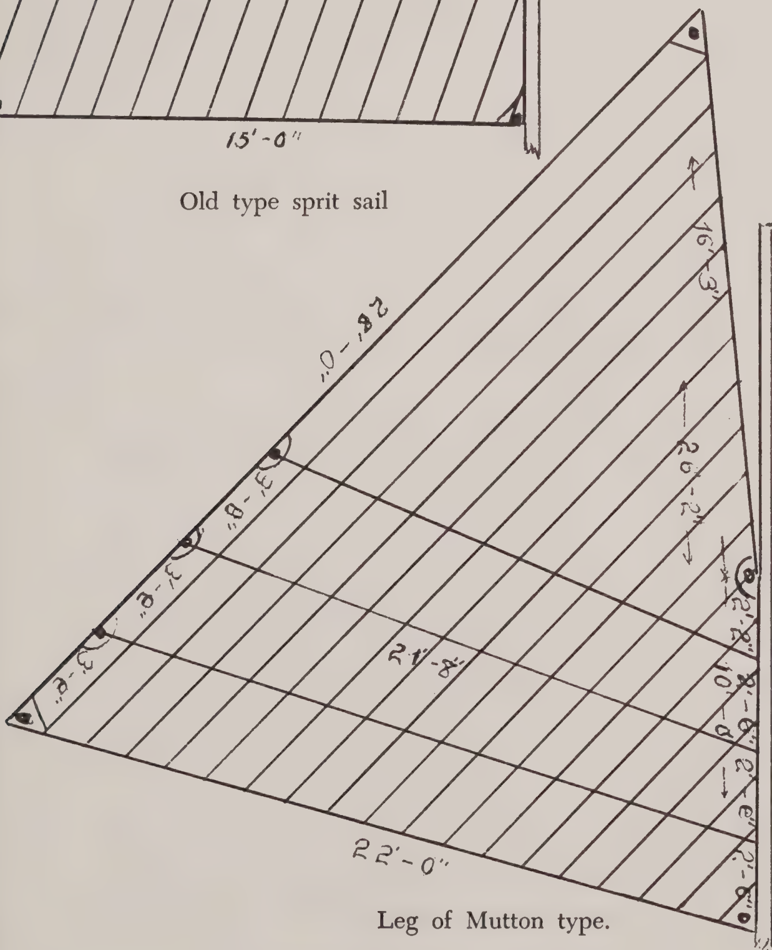
Whaleboats of any single builder are so nearly alike that he had patterns for every part, thus there are patterns for each strake. The most suitable boards are selected, the proper pattern laid on and marked around, the board is sawed to shape, its edges planed, and all loose knots are removed and their holes plugged. The boards were white cedar planed to 7/16ths inch thick. Where the different boards in a strake come together they are lapped 2½ inches the lap of each being beveled down to a very thin edge. The forward board being beveled on the inside, and the after board on the outside so the thin outside end pointed aft. The bevels are cut slightly concave so that when the ends are lapped and fastened by a cross line of nails, about an inch apart and clinched through a back piece a half inch thick by two inches wide, the ends are brought together very tight thus, when planed and painted, they are hard to find. These are called scarf butts and are always used in whaleboat construction.

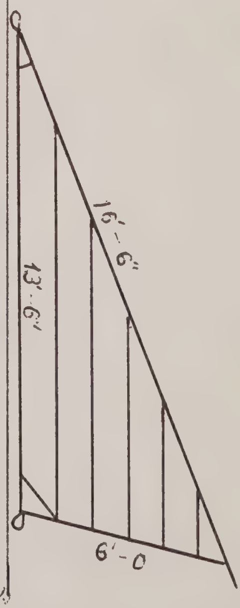
The first strakes to be set are the garboards, these are fitted against the keel and bear on the underside of the lips. They (the garboards) are clamped to the moulds and trimmed if need be to fit the rabbets at the ends. They are then fastened to the lips with clinch nails of soft iron, spaced



Old type sprit sail

Whaleboat sails





Leg of Mutton type.

about three inches apart; the ends are fastened to the stems with nails about two inches apart.

As the bottom edge of the next strake will lap onto the garboard ¾ of an inch, the top edge of the latter is beveled back about two feet from each end. These bevels are rather difficult to make because of their "twist," they begin at nothing and take the whole thickness of the strake at the ends near the stems. The garboards are beveled on the outside, the bevels beginning about three feet from the ends, between the bevels the edge is square. The second strake (that next to the garboard) has its lower inside edges at the ends beveled to fit the bevels on the garboards. It is lapped ¾ inch on the garboard, clamped to the moulds and, at points about three feet apart, to the garboard; the ends are nailed to the stems and the strake is fastened to the garboard by clinch nails through the lap. As the beveled ends draw together the projecting thickness grows less, disappearing at the ends. To explain it in another way, these bevels are fashioned in such a manner as to cause the lap joint to flow smoothly into what appears to be a butt joint such as is formed when the edges of two smooth boards are brought squarely together.

On the inside of the upper edge of the second strake is fitted a strip about 1¾ inches wide and the same thickness as the planking, called a batten. It is lapped half its width on the inside of the strake and clinch nailed. Its ends are closely fitted against the stems and any splices in its length are scarf splices similar to those in the planking always making certain batten splices do not fall on the plank splice. It is necessary to bevel or slightly round the side of the batten on account of the rounding of the boat. Strake number three is worked like number two for its entire length and is held in place by nails in the ends and clinch nails through the battens.

Strakes four and five are put on in the same manner as number three, except that number five has no batten on its upper edge but is beveled the same as the garboard. Strake number six is lapped on number five with clinch nails through

the lap. Strake number seven generally a half inch thick, is lapped on number six and clinch nailed through the lap. Thus each seam is either lapped or covered by a batten and tightness is obtained by binding the surfaces together by clinch nails rather than attempting to make closely fitted joints between the plank edges. The clinch nails are about three inches apart and are left out, to be put in afterwards, at the points where the timbers (ribs) are to be.

To a great degree the shape of the boat depends on the shape of the strakes and, as these often spring sidewise after being sawed to shape, it takes a great deal of skill and judgment to make them fit the moulds. Very often, in spite of braces and clamps, they do not fit, but if they lay fair with an easy curve, an inch or two away from the moulds doesn't matter. The length and depth are fixed quantities, but the exact shape at the various points is apt to differ in boats built on the same moulds.

With the planks all on, the boat is ready to timber (put the ribs in). The position of each timber is marked on the keel and a plumb line for each is marked on the inside of the planking by going up parallel with the moulds.

The timbers are sawed out with a width of about 1¾ inches for 4 or 5 inches in length for feet to lap on the keel. The feet are notched (about ¾ inch) so they fit onto the keel. The timbers are then pushed to bear against the laps and battens by overhead shores. The position of the laps and battens are marked, a scribe line, ⅜ of an inch from the planking, is marked on each side. The timber is then trimmed to the required depth so it will fit snugly over the battens and laps but will remain about 1/16th of an inch clear of the planking between the battens. The feet are cut level, about an inch high, the upper ends are cut 1¾ inches below the upper edge of the top strake, the cuts being diagonal from the outside to the inside across for about two inches of their length. They are fastened by a strong nail through the feet into the keel, a single clinch nail at each lap and two clinch nails at each batten, there would be a clinch nail through the center of the top strake.

For the first four feet from the ends of the boat the timbers were spaced a foot apart, the rest of the way they are spaced 8 inches apart.

While the number of strakes may vary, especially in the larger boats, seven strakes is the average. All nails are set below the surface, in most woodworking this entails two operations but in whaleboat construction it is accomplished in one operation. A turning iron is held on the inside when a clinch nail is to be driven, the nail is started with easy blows of the hammer and when almost in the nail is struck a sharp blow; as the nail is driven in, the wood around it is compressed by the hammer head, the nail clinches and "stays put" but the wood returns to shape leaving the nail set in about 1/16th inch. Much depends on the ability of the one holding the turning iron — if there is a good solid backing the nail sinks in below the surface but if the nail misses the iron, it usually results in a split plank. The hole thus made has to be filled with a wooden plug. With all the timbers in and set a few cross ties are tacked on to keep the boat from spreading, also light braces are set up from the floor to the bottom edge of the top strake after which the moulds and keel shores are removed.

Next come the gunwales, called "gunnels," long strips of clear oak 1¾ inches square; generally about eight feet of their ends are bent to the curve of the boat by being clamped to the forms. They are placed inside, flush with the top edge of the top strake, their ends are fitted together by scarfing each so that the joint will be in line with the center line of the boat. The joints have a 5/16ths inch through bolt headed over on the outside of the strake aft and the cheek pieces outside the strake forward. They are fitted closely to the stems but are not fastened directly to them. The gunwales are nailed through the top strake just enough to hold them in place while the other fittings are being set.

At the bow, the stem is cut off flush with the top of the top strake and gunwales, on these are set the bow-

chocks, which are of oak about three feet long and four inches high for about eight inches at their forward end, from there they taper down to about an inch at their after ends. They are cut flush with the inside of the gunwales but forward they curve outward until the ends are nearly parallel, the ends overhang the strake about an inch. The front ends are set two inches apart, forming a slot for the whale line. At the bottom of the slot is usually a concave brass roller about 1¼ inches in diameter for the line to run over; sometimes the roller is omitted and the bottom of the slot lined with lead, shaped and smoothed concave about three inches below the top of the chocks. About two inches above the roller or lead there is a quarter inch hole through the chocks for a small wooden pin (of oak or bamboo) to hold the line from jumping out of the slot.

Under the overhang of the chocks are the cheeks, pieces of oak six inches wide, an inch thick and eighteen inches long. They lap on the stem to its forward edge and are through bolted with three ¼ inch bolts through the stem, headed over forelock.

On the outside, level with the gunwales, are the ribbons, half round mouldings of oak 1¾ inch wide by ⅝th inch thick. Some boat builders made these ribbons a full inch thick; in later years the so-called "Portuguese boats" had a "ribbon" 1¾ inches square with just the upper corner slightly rounded. Whichever type ribbon was used, they butted against the cheeks forward and were fayed onto the sternpost aft. They were nailed through the top strakes to the gunwales about every foot; the "Portuguese" boats usually had quarter inch bolts, every two feet, headed over forelock, instead of nails.

Under the bottom edge of the top strake is a ribbon beginning about eight feet from the bow and stern. It is of oak two inches wide by a half inch thick, with its lower half beveled and its ends rounded. These ribbons look like a widening of the strake and are clinch nailed to the timbers.

Next are the seat risers, long narrow boards of spruce or oak (the former is preferred), these boards are about

3½ inches wide by ⅞ths inch thick and are the supports for the ends of the thwarts (seats). They are fastened along inside the boat inside the timbers with the top edges at the same height as the centerboard well amidships, fore and aft their ends are a little higher, two inches at the most, these risers are securely nailed to the timbers.

The ceiling (lining), is of the same stock as the planking (although it might be those boards that had a great many knots) it begins at the bottom with a central strip nailed to the level timber feet on the keel. From there it is carried up strake by strake to the seat risers. The ceiling is securely fastened to the timbers with short stiff iron nails. The ceiling usually stopped about two feet short of the ends of the boat.

At both ends there is a triangular piece of level floor, called head sheets and stern sheets. These are about four inches above the bottom ceiling board, and are made of half inch pine boards nailed to light cross pieces, called "bridges" which are fitted on the ceiling over timbers to which they are nailed. The forward platform begins 6½ feet from the bow, the after one 7 feet from the stern, each running towards the end of the boat until they come to a point on the ceiling. Just forward of the after platform the ceiling had a foot square opening left open as a bailing place. There would be a ¾ inch hole bored about two inches up from the keel in the starboard garboard to act as a drain when the boat was on the cranes.

The thwarts, there are five, are made of planed pine planks one inch thick by 7½ inches wide. The ends rested on the risers where they were securely nailed. They are spaced on centers, the bow seven feet from the tip of the stem, the stern about nine feet from the tip of the sternpost, the rest about three feet three inches from center to center. Numbers three and four thwarts crossed the centerboard well and were fastened to it. Number two held the hinged mast block ("pulpit"). Each thwart was kneed at each end to the side of the boat and to the gunwales, numbers two and four having two knees at each end,

the others one. (Some builders in later years had two knees on each end of number two thwart with the other thwarts having two knees on the side where the men sat when rowing.)

The knees were made of tough white oak, one inch thick by 1¼ inch wide. Before bending they were split through the center of the 1¼ inch side to within about four inches of the end. They are then steamed and bent edgewise, on a radius of about three inches. The short legs of the knees, about eight inches long, were nearly at right angles with the long legs which extend out on the thwarts almost to the center of the boat. The upright legs stood off from the planking the thickness of the gunwales, the spaces between the gunwales and the top of the thwarts being filled with pine backers, the thickness of the knees. These backers were glued to the knees and when the knees were fitted on the thwarts the backers were trimmed to fit against the planking so the top end of the knee would bear against the inside of the gunwales. In the upper end of each a ¼ inch bolt would go through the top strake gunwale and knee with the bolt headed over forelock. A similar bolt would go through the lap of the top strake and through the backer as well as the knee. The long legs were fastened to the thwarts with clinch nails. A whaleboat has so many thwart knees since these knees are all that keep the gunwales from splitting the top strake and springing up or out of the boat altogether.

Half the length of each thwart is built up of pine boards, one inch thick finished up flush with the arms of the knees, to make smooth seats for the rowers, who sit on the opposite side of the boat from their rowlocks. The bow thwart is fitted so the rower is on the port side, the others alternate from side to side. Sometimes the number two thwart (the mast thwart), which is double kneed on both ends, is covered its whole length with pine boards for extra strength.

The cleats, sometimes called chocks, for the rowlocks or tholepins are of oak, about 1½ inches thick by 2½ inches wide and 12 to 14 inches long. The center part, for about

six inches, is left at the full thickness, from this flat part to their ends they are slanted down to ¼ inch in thickness. These cleats are securely nailed to the gunwales, being centered about 16 inches aft of the center of the thwarts. It is these cleats that have the holes for the rowlocks or thole pins.

With its forward edge about three feet aft of the forward edge of the stem is the "clumsy cleat," a pine plank 1¾ inches thick by eight inches wide. This is set squarely across the boat, with the ends trimmed even with the top strake. Where it rests on the gunwales and top strake it is rabbeted on the underside, leaving one inch in thickness through which it is nailed to the gunwales. The boat builders leave the "cleat" with a straight edge on the after side but boatsteerers cut a semi-circular notch 6 to 8 inches wide by 3 or 4 inches deep just to port of center for a right handed man and to starboard of center for a left hander, some boats had both. This latter would indicate that perhaps the mate and boatsteerer worked from opposite sides. Usually the notch was lined with rope matting, canvas or leather, this notch provides a steady rest for the leg of the boatsteerer (harpooner) when darting the iron (harpoon) or the mate when lancing a whale. The space between the clumsy cleat and stem is floored with ½ inch pine boards, set about 4½ inches below the gunwales thus forming a triangular pit or sunken box about 4½ inches deep, called the "box."

Just aft of the clumsy cleat, on each side of the boat and securely fastened to the top of the gunwales, is a half cleat with its "horn" pointed forward. These are so placed as to catch the whale line if it jumps out of the bow chock. Primarily these cleats were used when "working" a whale. As the boat would be hauled up to the whale it would naturally be directly behind him and because of the danger from getting too close to the whale's flukes it was necessary to go out one side of the flukes. This was accomplished by lifting the line out of the bow chocks and catching it under one of these cleats. The boat would then sway out, much the same as a kite is forced up by the wind, the

boat would be towed along parallel to the whale about 10 or 12 feet away. In later years a "kicking strap" was added to the boats. This was made of a piece of whale line which was secured by having its ends passed through holes in each end of the clumsy cleat near the gunwales. Boats with "kicking straps" usually had the "horn cleats" just forward of the clumsy cleat. This was a much more practical and safer arrangement since it was impossible for the whale line to miss the cleats and go all the way aft.

About four and a half feet of the stern was decked over with ⅞ths inch boards laid crosswise and nailed to the top of the gunwales. On the after deck and extending its whole length is a curved piece of inch thick oak board called the "lion's tongue. This "tongue" was about 3½ inches wide at the after end where it was notched against the sternpost. The "tongue" curves with its outer edge flush with the starboard side of the boat for about 18 inches, from this point it runs straight forward to the edge of the deck. The inner edge of the "tongue" gradually curves away from the outer edge until the "tongue" is about six or seven inches wide for the forward foot or so of its length. As this "tongue" takes most of the strain on the loggerhead it is very securely nailed where lapping on the gunwale and clinch nailed to the deck. Various builders had slightly different patterns for the "lion's tongue," but the methods of fastening and purpose was the same in all cases.

The loggerhead, a very important part of the whaleboat, was a round post with slightly concave sides or tapered slightly with the greatest diameter at the top. This post six inches in its largest diameter and nine inches high, is centered in the lion's tongue about a foot from the tongue's forward end. The loggerhead was made of white oak and set plumb, below the round head it was cut to a square post beginning 3½ inches square and tapering to 2 inches at the bottom end. It was closely fitted in a mortise through the ceiling, and was kept from lifting by a fore and aft tapered wooden key under the deck.

When being rowed or working around whales, the boat was steered with an oar 20 to 22 feet long, that extended

out over the stern 15 to 16 feet. Although the whaleboat in many ways was like the ancient Viking craft there was one especially noticeable difference, the steering oar of the Viking craft was always on the right, or starboard side, while that of whaleboats was on the left, or port side. The arrangement for holding the steering oars varied; some boats simply had a becket through the sternpost with one end knotted and the other end made fast to a cleat on the deck, this formed a loop on the port side that held the oar. Some of the earlier boats had an outrigger made of three, 7/16ths inch iron rods, in the form of a tripod, each rod had a flattened end and was fastened, one on the sternpost, one to the gunwale about a foot forward of the stem, the third a foot or so down the side of the boat. This latter leg was bolted through the planking and an oak backing piece, six inches long, two inches wide and three quarters inch thick. The other ends, where they came together, had a socket welded in which was set a large rowlock with its bottom end peened over so it could not jump out. Another type was made of an iron bar 1½ inches wide, ¾ inch thick, and 18 inches long, this was fitted across the stern about six inches forward of the sternpost, extending out on the port side. This bar, which had a socket welded into its outboard end, was bolted to the gunwales.

Iron-work was expensive and a wooden substitute was perfected. An oak plank 4 inches wide 1½ inches thick and a foot or so long, was bolted to the deck and port gunwale about eight inches forward of the sternpost. Six inches from the outer end of the plank was an upright, also of oak, 6 inches high and 4 inches wide, both the top of this upright and the outer end of the plank were rounded to a two inch radius. One inch in from the end of the plank and the same distance down from the top of the upright were ¾ inch holes. Through these holes was a piece of ¾ inch diameter rope (usually whale line), the end under the horizontal plank was knotted and the other end had an eyesplice into which was spliced a small lanyard that was used to regulate the tension on the rope. The lanyard was fastened to a small cleat on the deck. The steering

oar rested on the outrigger underneath the rope becket and was held in place by the becket. This rope becket was usually built up to about 1½ inches in diameter with chaffing gear, called "bag of wrinkles," also covering the wood where the oar would bear. This latter type became most popular and, during the last 50 years of whaling, became almost universal.

When under sail the boat is steered with a rudder hung on pintles and gudgeons. This rudder, made of ¾ inch thick oak planks, was about 4½ feet high by about 2 feet wide at the widest point of the blade. The head, about 6 inches wide, had on each side a reinforced piece of oak plank, ¾ inch thick and 6 inches wide, that extended down about two feet onto the blade, forming the stock or neck of the rudder. The forward edge or beading followed the curve of the stem about two feet or so then curved sharply down. The rake or after side curved out from the stock then down. A three inch wide oak cleat the same thickness as the rudder planks was bolted to the bottom edge with quarter inch bolts. The stock was bolted together with quarter inch through bolts headed over forelock. The upper ends of the planks forming the blade were held together, edge to edge, by a long through bolt headed over on both ends or by iron straps, ⅛ inch thick by an inch wide, on each side that were through bolted. When new, the rudders were made so that either a pole tiller in a slot or a mortised one over a tenon could be used. The tenon was an extension of the plank between the two outside reinforcing planks on the stock. There were two pintles and gudgeons, one about three inches below the gunwale, the other slightly more than a foot lower, a few rudders had the lower gudgeon on the rudder with the pintle on the stem of the boat with its point up; this was not considered good practice since there was always the chance the line might get caught behind it if a whale went across the stern. When not in use, the rudder could be unhung and hauled up against the port quarter by means of lanyards.

On each side of the boat, opposite the rowlocks, are the oar rests or chocks, rounded blocks of wood about a

foot long, four inches wide and two inches thick, the top is left flat but the face is rounded down so the bottom edge is about ¾ inch thick. These are fastened to or just below the seat risers. Each has a hole in its face to receive the ends of the oar handles so the oars can be "peaked," ready for instant use while the men are hauling in on the whale line. For number four, or "tub" oar there is an extra cleat, this is similar to the others but is rounded both ways from the center hole. This cleat is fastened to the timbers, just above the seat riser directly over the regular cleat for the "tub" or number four oar. When lowered for whales the large line tub is between thwarts numbers 4 and 5 and the upper cleat must be used as the oar will not clear the tub and go into the lower cleat when "peaked."

The early whaleboats "stepped" their masts through a block hinged to the thwart in front of the center board well, the foot of the mast fitted into a mortised block fastened to the keel. The hinged block was of oak, 2 inches thick and about 10 inches in length and width. The after corners were square but the front corners were cut to an angle so that the front half of the block was octagonal. The block was recessed back into the thwart about 2½ inches and was held by a heavy cast brass hinge shaped like a "U," the loop extending around the front half of the four inch mast hole. The straight legs extended across the thwart, the hinge joints being over the after edge of the block. The hinge was fastened to the block and thwarts by brass bolts and nuts.

In later years, when larger and different shaped sails came into general use, the hinged block was moved a foot or two forward and set between two planks, each about four inches wide by two inches thick, bolted to numbers one and two thwarts. These planks were spaced about six inches apart with the hinged block set between them. The two planks were each recessed about two inches, to take the "pulpit". As with the older type, the block was cut with the forward end octagonal and was held by a heavy brass hinge shaped similar to the older type. The loop of the hinge extended around the front half of the mast hole,

which were larger than before (usually 5 to 5½ inches in diameter), the straight legs extended along the side planks aft of the recessed sections with the hinge joints over the after edge of the blocks. The hinge was fastened to the block either with brass nuts and bolts or heavy brass screws. A slanted trough was fitted between thwart number one and the mast "step," a block of oak, 6 inches wide, 12 inches long and three inches thick, bolted to the keel.

Near the forward end of the stern sheets (the after platform), on the port side, was a removable foot brace made of oak about two inches square. This brace was footed in the platform 8 to 10 inches from the side of the boat and curved in an arc to the boat's side about 10 inches above the platform.

Except for the platforms, the boats were painted and all nails set and puttied. As a general rule the hull of all the boats were painted white but the various builders usually painted the gunwales and sometimes the ceiling a distinctive color; one had a light blue, another had a sickly looking orange, while a third bad a pink, the same color usually extended down inside to at least the seat risers.

The word ABOUT has perhaps seemed overworked but since this description is not of a specific boat, some leeway is necessary. Each builder had his own patterns and moulds and, although all whaleboats appeared much alike, those of different builders could be easily distinguished. A glance could tell the experienced eye whether a whaleboat was a "Beetle," "Leonard" or "Delano."

No matter which shop built the boat the one thing that was "standard" was the spacing of the hoisting eyes, these are twenty-two feet apart; one passes through the center of the clumsy cleat forward and the other through the cuddy deck aft, about a foot from the deck's forward edge. These "eyes" are fashioned of ¾ inch iron rods that extend down through the keel. The eye is at the top and the bottom end of the rod is headed over forelock outside the keel.